SEQUENCE LISTING

<210> JOBLING, STEPHEN A.
       SAFFORD, RICHARD

<120> IMPROVEMENTS IN OR RELATING TO STARCH CONTENT OF PLANTS

<130> 54163-5001-US

<140> 09/297,703
<141> 1999-07-19

<150> 9623095.8
<151> 1996-11-05

<150> PCT/GB97/03032
<151> 1997-11-04

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<170> PatentIn version 3.2

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cct tgt gct cca ctc tgc aaa tct caa tct acc ggc ttc cat ggc tat       101
Pro Cys Ala Pro Leu Cys Lys Ser Gln Ser Thr Gly Phe His Gly Tyr
            15                  20                  25

cgg agg acc tcc tct tgc ctt tcc ttc aac ttc aag gag gcg ttt tct       149
Arg Arg Thr Ser Ser Cys Leu Ser Phe Asn Phe Lys Glu Ala Phe Ser
        30                  35                  40

agg agg gtc ttc tct gga aag tca tct cat gaa tct gac tcc tca aat       197
Arg Arg Val Phe Ser Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn
    45                  50                  55

gta atg gtc act gct tct aaa aga gtc ctt cct gat ggt cgg att gaa       245
Val Met Val Thr Ala Ser Lys Arg Val Leu Pro Asp Gly Arg Ile Glu
60                  65                  70                      75

tgc tat tct tct tca aca gat caa ttg gaa gcc cct ggc aca gtt tca       293
Cys Tyr Ser Ser Ser Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser
                    80                  85                  90

gaa gaa tcc cag gtg ctt act gat gtt gag agt ctc att atg gat gat       341
Glu Glu Ser Gln Val Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp
                95                  100                 105

aag att gtt gaa gat gaa gta aat aaa gaa tct gtt cca atg cgg gag       389
Lys Ile Val Glu Asp Glu Val Asn Lys Glu Ser Val Pro Met Arg Glu
        110                 115                 120

aca gtt agc atc aga aaa att gga tct aaa cca agg tcc att cct cca       437
Thr Val Ser Ile Arg Lys Ile Gly Ser Lys Pro Arg Ser Ile Pro Pro
    125                 130                 135

ccc ggc aga ggg caa aga ata tat gac ata gat cca agc ttg aca ggc       485

7

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Pro Gly Arg Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Thr Gly
140                 145             150                 155

ttt cgt caa cac cta gat tac cgg tat tca cag tac aaa aga ctc cga    533
Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg
                160             165                 170

gaa gaa att gac aag tat gaa ggt agt ctg gat gca ttt tct cgt ggc    581
Glu Glu Ile Asp Lys Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly
                175             180             185

tat gaa aag ttt ggt ttc tca cgc agt gaa aca gga ata act tat aga    629
Tyr Glu Lys Phe Gly Phe Ser Arg Ser Glu Thr Gly Ile Thr Tyr Arg
                190             195             200

gag tgg gca cca gga gct acg tgg gct gca ttg att gga gat ttc aat    677
Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn
        205             210             215

aac tgg aat cct aat gca gat gtc atg act cag aat gag tgt ggt gtc    725
Asn Trp Asn Pro Asn Ala Asp Val Met Thr Gln Asn Glu Cys Gly Val
220             225             230             235

tgg gag atc ttt ttg ccg aat aat gca gat ggt tca cca cca att ccc    773
Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro
                240             245             250

cat ggt tct cga gta aag ata cgc atg gat act cca tct ggc aac aaa    821
His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys
                255             260             265

gat tct att cct gct tgg atc aag ttc tca gtt caa gca cca ggt gaa    869
Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu
                270             275             280

ctc cca tat aat ggc ata tac tat gat cct ccc gag gag gag aag tat    917
Leu Pro Tyr Asn Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr
        285             290             295

gtg ttc aaa aat cct cag cca aag aga cca aaa tca ctt cgg att tat    965
Val Phe Lys Asn Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr
300             305             310             315

gag tcg cac gtt gga atg agt agt acg gag cca gta att aac aca tat    1013
Glu Ser His Val Gly Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr
                320             325                 330

gcc aac ttt aga gat gat gtg ctt cct cgc atc aaa aag ctt ggc tac    1061
Ala Asn Phe Arg Asp Asp Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr
                335             340             345

aat gct gtt cag ctc atg gct att caa gag cat tca tat tat gct agt    1109
Asn Ala Val Gln Leu Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser
        350             355             360
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8

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ttt ggg tat cac gtc aca aac ttt tat gca gct agc agc cga ttt gga          1157
Phe Gly Tyr His Val Thr Asn Phe Tyr Ala Ala Ser Ser Arg Phe Gly
    365                 370                 375

act cct gat gat tta aag tct cta ata gat aaa gct cac gag tta ggt          1205
Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly
380                 385                 390                 395

ctt ctt gtt ctc atg gat att gtt cat agc cat gca tca act aat acg          1253
Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Thr Asn Thr
                400                 405                 410


ttg gat ggg ctg aat atg ttt gat ggt acg gat ggt cac tac ttt cac          1301
Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Gly His Tyr Phe His
            415                 420                 425

tct gga cca cgg ggt cat cat tgg atg tgg gac tct cgc ctt ttc aac          1349
Ser Gly Pro Arg Gly His His Trp Met Trp Asp Ser Arg Leu Phe Asn
        430                 435                 440

tat ggg agc tgg gag gtt cta agg ttt ctt ctt tca aat gca agg tgg          1397
Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp
        445                 450                 455

tgg ttg gat gag tac aag ttt gat ggg ttc aga ttt gat ggg gtg act          1445
Trp Leu Asp Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr
460                 465                 470                 475

tca atg atg tac acc cat cat gga ttg cag gta gat ttt acc ggc aac          1493
Ser Met Met Tyr Thr His His Gly Leu Gln Val Asp Phe Thr Gly Asn
                480                 485                 490

tac aat gaa tac ttt gga tat gca act gat gta gat gct gtg gtt tat          1541
Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Val Tyr
            495                 500                 505

ttg atg ctg ttg aat gat atg att cat ggt ctc ttc cca gag gct gtc          1589
Leu Met Leu Leu Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val
        510                 515                 520

acc att ggt gaa gat gtt agt gga atg cca aca gtt tgc att ccg gtt          1637
Thr Ile Gly Glu Asp Val Ser Gly Met Pro Thr Val Cys Ile Pro Val
        525                 530                 535

gaa gat ggt ggt gtt ggc ttt gat tat cgt ctc cac atg gct gtt gct          1685
Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Val Ala
540                 545                 550                 555

gat aaa tgg gtt gag att att cag aag aga gat gaa gat tgg aaa atg          1733
Asp Lys Trp Val Glu Ile Ile Gln Lys Arg Asp Glu Asp Trp Lys Met
                560                 565                 570

ggt gac att gta cat atg ctg acc aac agg cgg tgg ttg gaa aag tgt          1781
Gly Asp Ile Val His Met Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys
            575                 580                 585
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gtt tct tat gct gaa agt cat gac cag gcc ctt gtt ggt gac aaa act    1829
Val Ser Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr
        590                 595                 600

att gca ttt tgg ctg atg gac aag gat atg tat gac ttc atg gct ctt    1877
Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu
        605                 610                 615

gac aga cca tct act cct ctc ata gat cgt gga gta gca ttg cac aaa    1925
Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Val Ala Leu His Lys
620                 625                 630                 635


atg atc agg ctt att acc atg gga tta ggc gga gaa gga tat ttg aat    1973
Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn
                640                 645                 650

ttt atg gga aat gaa ttt gga cac ccc gag tgg att gat ttt cca aga    2021
Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg
                655                 660                 665

ggt gat cta cat ctt ccc agt ggt aaa ttt gtt cct ggg aac aat tac    2069
Gly Asp Leu His Leu Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr
            670                 675                 680

agt tat gat aaa tgc cgg cgt agg ttt gat cta ggc aat tca aag cat    2117
Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys His
            685                 690                 695

ctg aga tat cat gga atg caa gag ttt gat caa gca att cag cat ctt    2165
Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Ile Gln His Leu
700                 705                 710                 715

gaa gaa gcc tat ggt ttc atg act tct gag cac caa tac ata tca cgg    2213
Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg
                720                 725                 730

aag gat gaa agg gat cgg atc att gtc ttc gag agg gga aac ctc gtt    2261
Lys Asp Glu Arg Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val
                735                 740                 745

ttt gta ttc aat ttt cat tgg act agc agc tat tcg gat tac cga gtt    2309
Phe Val Phe Asn Phe His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg Val
                750                 755                 760

ggc tgc tta aag cca gga aag tac aag ata gtc ttg gat tca gat gat    2357
Gly Cys Leu Lys Pro Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp
            765                 770                 775

cct ttg ttt gga ggc ttt ggc agg ctt agt cat gat gca gag cac ttc    2405
Pro Leu Phe Gly Gly Phe Gly Arg Leu Ser His Asp Ala Glu His Phe
780                 785                 790                 795

agc ttt gaa ggg tgg tac gat aac cgg cct cga tcc ttc atg gtg tac    2453
Ser Phe Glu Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr
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10

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aca cca tgt aga aca gca gtg gtc tat gct tta gtg gag gat gaa gtg    2501
Thr Pro Cys Arg Thr Ala Val Val Tyr Ala Leu Val Glu Asp Glu Val
        815             820             825

gag aat gaa ttg gaa cct gtc gcc ggt taa gatatatctt aacaacaggt      2551
Glu Asn Glu Leu Glu Pro Val Ala Gly
        830             835

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Cys Leu Ser Phe Asn Phe Lys Glu Ala Phe Ser Arg Arg Val Phe Ser
        35              40              45

Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn Val Met Val Thr Ala
        50              55              60

Ser Lys Arg Val Leu Pro Asp Gly Arg Ile Glu Cys Tyr Ser Ser Ser
65              70              75              80

Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser Glu Glu Ser Gln Val
        85              90              95

Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp Lys Ile Val Glu Asp
        100             105             110

Glu Val Asn Lys Glu Ser Val Pro Met Arg Glu Thr Val Ser Ile Arg
        115             120             125

Lys Ile Gly Ser Lys Pro Arg Ser Ile Pro Pro Pro Gly Arg Gly Gln
        130             135             140

Arg Ile Tyr Asp Ile Asp Pro Ser Leu Thr Gly Phe Arg Gln His Leu
145             150             155             160

Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg Glu Glu Ile Asp Lys
                165             170             175

Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly Tyr Glu Lys Phe Gly
        180             185             190
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Phe Ser Arg Ser Glu Thr Gly Ile Thr Tyr Arg Glu Trp Ala Pro Gly
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Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn Asn Trp Asn Pro Asn
210             215             220

Ala Asp Val Met Thr Gln Asn Glu Cys Gly Val Trp Glu Ile Phe Leu
225             230             235             240

Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro His Gly Ser Arg Val
            245             250             255

Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys Asp Ser Ile Pro Ala
            260             265             270

Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu Leu Pro Tyr Asn Gly
        275             280             285

Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr Val Phe Lys Asn Pro
    290             295             300

Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr Glu Ser His Val Gly
305         310             315             320

Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr Ala Asn Phe Arg Asp
            325             330             335

Asp Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala Val Gln Leu
            340             345             350

Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly Tyr His Val
        355             360             365

Thr Asn Phe Tyr Ala Ala Ser Ser Arg Phe Gly Thr Pro Asp Asp Leu
    370             375             380

Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly Leu Leu Val Leu Met
385             390             395             400

Asp Ile Val His Ser His Ala Ser Thr Asn Thr Leu Asp Gly Leu Asn
            405             410             415

Met Phe Asp Gly Thr Asp Gly His Tyr Phe His Ser Gly Pro Arg Gly
            420             425             430

His His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly Ser Trp Glu
        435             440             445

Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp Trp Leu Asp Glu Tyr
    450             455             460

Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met Met Tyr Thr
465             470             475             480

His His Gly Leu Gln Val Asp Phe Thr Gly Asn Tyr Asn Glu Tyr Phe
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12

Gly Tyr Ala Thr Asp Val Asp Ala Val Val Tyr Leu Met Leu Leu Asn
   500      505     510

Asp Met Ile His Gly Leu Phe Pro Glu Ala Val Thr Ile Gly Glu Asp
   515     520     525

Val Ser Gly Met Pro Thr Val Cys Ile Pro Val Glu Asp Gly Gly Val
   530     535     540

Gly Phe Asp Tyr Arg Leu His Met Ala Val Ala Asp Lys Trp Val Glu
545      550     555     560

Ile Ile Gln Lys Arg Asp Glu Asp Trp Lys Met Gly Asp Ile Val His
   565     570     575

Met Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys Val Ser Tyr Ala Glu
   580     585     590

Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr Ile Ala Phe Trp Leu
   595     600     605

Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu Asp Arg Pro Ser Thr
   610     615     620

Pro Leu Ile Asp Arg Gly Val Ala Leu His Lys Met Ile Arg Leu Ile
625      630     635     640

Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn Glu
   645     650     655

Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp Leu His Leu
   660     665     670

Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr Ser Tyr Asp Lys Cys
   675     680     685

Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys His Leu Arg Tyr His Gly
   690     695     700

Met Gln Glu Phe Asp Gln Ala Ile Gln His Leu Glu Glu Ala Tyr Gly
705      710     715     720

Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp Glu Arg Asp
   725     730     735

Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val Phe Asn Phe
   740     745     750

His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg Val Gly Cys Leu Lys Pro
   755     760     765

Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Pro Leu Phe Gly Gly
   770     775     780

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Phe Gly Arg Leu Ser His Asp Ala Glu His Phe Ser Phe Glu Gly Trp
785             790             795             800

Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Thr Pro Cys Arg Thr
                805             810             815

Ala Val Val Tyr Ala Leu Val Glu Asp Glu Val Glu Asn Glu Leu Glu
            820             825             830

Pro Val Ala Gly
        835


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tctcaccgaa atg gta tac tac act gta tca ggc ata cgt ttt cct tgt       169
            Met Val Tyr Tyr Thr Val Ser Gly Ile Arg Phe Pro Cys
            1               5               10

gca cct tca ctc tac aaa tct cag ctc acc agc ttc cat ggc ggt cga      217
Ala Pro Ser Leu Tyr Lys Ser Gln Leu Thr Ser Phe His Gly Gly Arg
    15              20              25

agg acc tct tct ggc ctt tcc ttc ctc ttg aag aag gag ctg ttt cct      265
Arg Thr Ser Ser Gly Leu Ser Phe Leu Leu Lys Lys Glu Leu Phe Pro
30              35              40              45

cgg aag atc ttt gct gga aag tcc tct tat gaa tct gac tcc tca aat      313
Arg Lys Ile Phe Ala Gly Lys Ser Ser Tyr Glu Ser Asp Ser Ser Asn
                50              55              60

tta act gtc tct gca tct gag aag gtc ctt gtt cct gat gat cag att      361
Leu Thr Val Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile
            65              70              75

gat ggc tct tct tct tca aca tat caa tta gaa acc act ggc aca gtt      409
Asp Gly Ser Ser Ser Ser Thr Tyr Gln Leu Glu Thr Thr Gly Thr Val
            80              85              90

ttg gag gaa tcc cag gtt ctt ggt gat gca gag agt ctt gtg atg gaa      457
Leu Glu Glu Ser Gln Val Leu Gly Asp Ala Glu Ser Leu Val Met Glu
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14

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                95                      100                     105

gat gat aag aat gtt gag gag gat gaa gta aaa aaa gag tcg gtt cca         505
Asp Asp Lys Asn Val Glu Glu Asp Glu Val Lys Lys Glu Ser Val Pro
110             115             120             125

ttg cat gag aca att agc att gga aaa agt gaa tct aaa cca agg tcc         553
Leu His Glu Thr Ile Ser Ile Gly Lys Ser Glu Ser Lys Pro Arg Ser
                130             135             140

att cct cca cct ggc agt ggg cag aga ata tat gac ata gat cca agc         601
Ile Pro Pro Pro Gly Ser Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser
            145             150             155

ttg gca ggt ttc cgt cag cat ctt gac tac cga tat tca cag tac aaa         649
Leu Ala Gly Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys
            160             165             170

agg ctg cgt gag gaa att gac aag tat gaa ggt ggt ttg gat gca ttc         697
Arg Leu Arg Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe
            175             180             185

tct cgt gga ttt gaa aag ttt ggt ttc tta cgc agt gaa aca gga ata         745
Ser Arg Gly Phe Glu Lys Phe Gly Phe Leu Arg Ser Glu Thr Gly Ile
190             195             200             205

act tat agg gaa tgg gca cct gga gct acg tgg gct gca ctt att gga         793
Thr Tyr Arg Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly
                210             215             220

gat ttc aac aat tgg aat cct aat gca gat gtc atg act cgg aat gag         841
Asp Phe Asn Asn Trp Asn Pro Asn Ala Asp Val Met Thr Arg Asn Glu
                225             230             235

ttt ggt gtc tgg gag att ttt ttg cca aat aac gca gat ggt tca cca         889
Phe Gly Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro
            240             245             250

cca att cct cat ggt tct cga gta aag ata cgc atg gat act cca tct         937
Pro Ile Pro His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser
255             260             265

ggc atc aaa gat tca att cct gct tgg atc aag ttc tca gtt cag gca         985
Gly Ile Lys Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala
270             275             280             285

cct ggt gaa atc cca tac aat gcc ata tac tat gat cca cca aag gag        1033
Pro Gly Glu Ile Pro Tyr Asn Ala Ile Tyr Tyr Asp Pro Pro Lys Glu
                290             295             300

gag aag tat gtg ttc aaa cat cct cag cca aag aga cca aaa tca ctt        1081
Glu Lys Tyr Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu
                305             310             315

agg att tat gaa tct cat gtt ggg atg agt agt atg gag cca ata att        1129
```

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Arg Ile Tyr Glu Ser His Val Gly Met Ser Ser Met Glu Pro Ile Ile
        320                 325                 330

aac aca tat gcc aac ttt aga gat gat atg ctt cct cgc atc aaa aag    1177
Asn Thr Tyr Ala Asn Phe Arg Asp Asp Met Leu Pro Arg Ile Lys Lys
        335                 340                 345

ctt ggc tac aat gct gtt cag atc atg gct att caa gag cat tcc tat    1225
Leu Gly Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr
350                 355                 360                 365

tat gct agt ttt ggg tac cat gtc aca aac ttt ttt gca cct agc agc    1273
Tyr Ala Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser
                370                 375                 380

cga ttt gga act cct gat gat ttg aag tct tta ata gat aaa gct cat    1321
Arg Phe Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His
                385                 390                 395


gag tta ggg ctg ctt gtt ctc atg gat att gtt cat agc cat gcg tca    1369
Glu Leu Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser
                400                 405                 410

aat aat acg ttg gat ggg ctg aac atg ttt gat ggt acg gat agt cac    1417
Asn Asn Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His
        415                 420                 425

tac ttc cac tcc gga tca cgg ggt cat cat tgg ttg tgg gac tct cgc    1465
Tyr Phe His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg
430                 435                 440                 445

ctt ttc aac tat gga agc tgg gag gtg cta aga ttt ctt ctt tca aat    1513
Leu Phe Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn
                450                 455                 460

gca aga tgg tgg ttg gaa gag tac agg ttt gat ggt ttt aga ttt gat    1561
Ala Arg Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp
                465                 470                 475

ggg gtg act tcc atg atg tac act ccc cat ggg ttg cag gta gct ttt    1609
Gly Val Thr Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe
                480                 485                 490

act ggc aac tac aat gag tac ttt gga tat gca act gat gta gat gct    1657
Thr Gly Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala
        495                 500                 505

gtg att tat ttg atg ctt gtg aat gat atg att cac ggt ctt ttc cct    1705
Val Ile Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro
510                 515                 520                 525

gag gct gtt acc att ggt gaa gat gtt agc gga aag cca aca ttt tgc    1753
Glu Ala Val Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys
                530                 535                 540
```

16

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att cca gtg gaa gat ggt ggt gtt gga ttt gat tac cgt ctc cac atg      1801
Ile Pro Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met
            545             550             555

gcc att gcc gat aaa tgg att gag att ctt aag aag aga gat gag gac      1849
Ala Ile Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp
            560             565             570

tgg aaa atg ggt gac att gtg cat aca ctc acc aac aga agg tgg ttg      1897
Trp Lys Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu
            575             580             585

gaa aaa tgt gtt gct tat gct gaa agt cat gac caa gct ctt gtt ggt      1945
Glu Lys Cys Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly
590             595             600             605

gac aaa act att gca ttt tgg ctg atg gac aag gac atg tac gac ttc      1993
Asp Lys Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe
            610             615             620


atg gct cgt gac aga cca tct act cct ctt ata gat cgt gga ata gca      2041
Met Ala Arg Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala
            625             630             635

ttg cac aaa atg atc agg ctt att acc atg ggc tta ggc gga gaa gga      2089
Leu His Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly
            640             645             650

tat ttg aat ttt atg gga aat gaa ttt gga cat cct gag tgg att gat      2137
Tyr Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp
            655             660             665

ttt cca aga ggg gat cga cat ctg ccc aat ggt aaa gta att cca ggg      2185
Phe Pro Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly
670             675             680             685

aac aac cac agt tat gat aaa tgc cgt cgt aga ttt gat cta ggt gat      2233
Asn Asn His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp
            690             695             700

gca gac tat cta aga tat cat gga atg caa gag ttt gat cag gca atg      2281
Ala Asp Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met
            705             710             715

caa cat ctt gaa gaa gcc tat ggt ttc atg act tct gag cac cag tat      2329
Gln His Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr
            720             725             730

ata tca cgg aag gat gaa gga gat cgg atc att gtc ttt gag agg gga      2377
Ile Ser Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly
            735             740             745

aac ctt gtt ttt gta ttc aac ttt cat tgg act aac agc tat tca gat      2425
Asn Leu Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp
750             755             760             765
```

17

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tac cga gtt ggc tgc ttc aag tca gga aag tac aag att gtt ttg gac    2473
Tyr Arg Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp
                770             775             780

tcg gat gat ggc ttg ttt gga ggc ttc aac agg ctt agt cat gat gcc    2521
Ser Asp Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala
                785             790             795

gag cac ttc acc ttt gac ggg tgg tat gat aac cgg cct cgg tcc ttc    2569
Glu His Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe
            800             805             810

atg gta tat gca cca tct agg aca gca gtg gtc tat gct tta gta gaa    2617
Met Val Tyr Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Val Glu
        815             820             825

gat gaa gag aat gaa gca gag aat gaa gta gaa agt gaa gtg aaa cca    2665
Asp Glu Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro
830             835             840             845

gcc tcc ggc tga gatagatatt tagtaagagg atcccctaaa gcaggaatgg        2717
Ala Ser Gly

ttaacctgtg catctgcatt gaacgacgta tattgagact ggaaatccat atgactagta  2777

gatcctctag agtcgacctg caggcatg                                     2805


<210> 31
<211> 848
<212> PRT
<213> Artificial sequence

<220>
<223> cassava SBE II tuber cDNA in pSJ146

<400> 31
Met Val Tyr Tyr Thr Val Ser Gly Ile Arg Phe Pro Cys Ala Pro Ser
1               5                   10                  15

Leu Tyr Lys Ser Gln Leu Thr Ser Phe His Gly Gly Arg Arg Thr Ser
            20                  25                  30

Ser Gly Leu Ser Phe Leu Leu Lys Lys Glu Leu Phe Pro Arg Lys Ile
            35                  40                  45

Phe Ala Gly Lys Ser Ser Tyr Glu Ser Asp Ser Ser Asn Leu Thr Val
        50                  55                  60

Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile Asp Gly Ser
65                  70                  75                  80

Ser Ser Ser Thr Tyr Gln Leu Glu Thr Thr Gly Thr Val Leu Glu Glu
                85                  90                  95

Ser Gln Val Leu Gly Asp Ala Glu Ser Leu Val Met Glu Asp Asp Lys
```

18

Asn Val Glu Glu Asp Glu Val Lys Lys Glu Ser Val Pro Leu His Glu
        115             120             125

Thr Ile Ser Ile Gly Lys Ser Glu Ser Lys Pro Arg Ser Ile Pro Pro
    130             135             140

Pro Gly Ser Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Ala Gly
145             150             155             160

Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg
            165             170             175

Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe Ser Arg Gly
            180             185             190

Phe Glu Lys Phe Gly Phe Leu Arg Ser Glu Thr Gly Ile Thr Tyr Arg
        195             200             205

Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn
    210             215             220

Asn Trp Asn Pro Asn Ala Asp Val Met Thr Arg Asn Glu Phe Gly Val
225             230             235             240

Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro
            245             250             255

His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Ile Lys
            260             265             270

Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu
        275             280             285

Ile Pro Tyr Asn Ala Ile Tyr Tyr Asp Pro Pro Lys Glu Glu Lys Tyr
    290             295             300

Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr
305             310             315             320

Glu Ser His Val Gly Met Ser Ser Met Glu Pro Ile Ile Asn Thr Tyr
            325             330             335

Ala Asn Phe Arg Asp Asp Met Leu Pro Arg Ile Lys Lys Leu Gly Tyr
            340             345             350

Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser
        355             360             365

Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe Gly
    370             375             380

Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly
385             390             395             400

```
Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn Thr
              405             410             415

Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe His
              420             425             430

Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe Asn
              435             440             445

Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp
      450             455             460

Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val Thr
465             470             475             480

Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly Asn
              485             490             495

Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile Tyr
              500             505             510

Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val
      515             520             525


Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro Val
      530             535             540

Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile Ala
545             550             555             560

Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys Met
              565             570             575

Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys
              580             585             590

Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr
      595             600             605

Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Arg
      610             615             620

Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His Lys
625             630             635             640

Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn
              645             650             655

Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg
              660             665             670

Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn His
              675             680             685

Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr
      690             695             700
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Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His Leu
705                 710                 715                 720

Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg
                725                 730                 735

Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val
                740                 745                 750

Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg Val
                755                 760                 765

Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp
        770                 775                 780

Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His Phe
785                 790                 795                 800

Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr
                805                 810                 815

Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Val Glu Asp Glu Glu
                820                 825                 830


Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser Gly
        835                 840                 845


<210> 32
<211> 4
<212> PRT
<213> Artificial sequence

<220>
<223> amino acid sequence within SBE class A enzyme of cassava

<400> 32
Asn Ser Lys His
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<210> 33
<211> 4
<212> PRT
<213> Artificial sequence

<220>
<223> conserved sequence within SBE class A enzyme of cassava

<220>
<221> MISC_FEATURE
<222> (3)..(3)
<223> X can be either Asp or Glu

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<400> 33
Asp Ala Xaa Tyr
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<210> 34
<211> 15
<212> PRT
<213> Artificial sequence

<220>
<223> amino acid sequence in clone pSJ107

<400> 34
Tyr Arg Arg Thr Ser Ser Cys Leu Ser Phe Asn Phe Lys Glu Ala
1               5                   10                  15


<210> 35
<211> 16
<212> PRT
<213> Artificial sequence

<220>
<223> amino acid sequence in clone pSJ116


<400> 35
Asp Arg Arg Thr Ser Ser Cys Leu Ser Phe Ile Phe Lys Lys Ala Ala
1               5                   10                  15


<210> 36
<211> 4
<212> PRT
<213> Artificial sequence

<220>
<223> conserved sequence in SBEII proteins

<400> 36
Val Val Tyr Ala
1


<210> 37
<211> 7
<212> PRT
<213> Artificial sequence

<220>
<223> mature terminus of pea protein

<400> 37
Ala Lys Phe Ser Arg Asp Ser
1               5
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<210> 38
<211> 7
<212> PRT
<213> Artificial sequence

<220>
<223> predicted mature terminus of cassava SBEII protein

<400> 38
Gly Lys Ser Ser His Glu Ser
1               5


<210> 39
<211> 3074
<212> DNA
<213> Manihot esculenta

<220>
<221> CDS
<222> (127)..(2658)

<220>
<221> modified_base
<222> (58)
<223> a, t, c, g, other or unknown

<400> 39
tatggattga catcgataat acgactcact atagggattt cttttttttt ctttttgntt 60

tttaaaaaaa gttgaacatg caattagttg cgtcagttct cacactctct ctaacttctc 120

agcgaa atg gga cac tac acc ata tca gga ata cgt ttt cct tgt gct      168
       Met Gly His Tyr Thr Ile Ser Gly Ile Arg Phe Pro Cys Ala
        1               5                   10

cca ctc cgc aaa tct caa tct acc ggc ttc cat ggt gat cga agg acc      216
Pro Leu Arg Lys Ser Gln Ser Thr Gly Phe His Gly Asp Arg Arg Thr
 15                  20                  25                  30

tcc tct tgc ctt tcc ttc aac ttc aag aag gcg gcg ttt tct agg agg      264
Ser Ser Cys Leu Ser Phe Asn Phe Lys Lys Ala Ala Phe Ser Arg Arg
                 35                  40                  45

gtc ttc tct gga aag tca tct cat gaa tct gac tcc tca aat gta atg      312
Val Phe Ser Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn Val Met
                 50                  55                  60

gtc act gcg tct aaa aga gtc ctt cct gat ggt cgg att gaa tgc tat      360
Val Thr Ala Ser Lys Arg Val Leu Pro Asp Gly Arg Ile Glu Cys Tyr
             65                  70                  75

tct tct tca aca gat caa ttg gaa gcc cct ggc aca gtt tca gaa gaa      408
Ser Ser Ser Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser Glu Glu
    80                  85                  90

23

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tcc cag gtg ctt act gat gtt gag agt ctc att atg gat gat aag att        456
Ser Gln Val Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp Lys Ile
 95                 100             105                 110

gtt gaa gat gaa gta aat aaa gaa tct gtt cca atg cgg gag aca gtt        504
Val Glu Asp Glu Val Asn Lys Glu Ser Val Pro Met Arg Glu Thr Val
                    115             120                 125

agc atc gga aaa att gga tct aaa cca agg tcc att cct cca ccc ggc        552
Ser Ile Gly Lys Ile Gly Ser Lys Pro Arg Ser Ile Pro Pro Pro Gly
                130             135             140

aga ggg caa aga ata tat gac ata gat cca agc ttg aca ggc ttt cgt        600
Arg Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Thr Gly Phe Arg
            145             150             155

caa cac cta gat tac cgg tat tca cag tac aaa aga ctc cga gaa gaa        648
Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg Glu Glu
        160             165             170

att gac aag tat gaa ggt agt ctg gat gca ttt tct cgt ggc tat gaa        696
Ile Asp Lys Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly Tyr Glu
175             180             185                 190

aag ttt ggt ttc tca cgc agt gaa aca gga ata act tat aga gag tgg        744
Lys Phe Gly Phe Ser Arg Ser Glu Thr Gly Ile Thr Tyr Arg Glu Trp
                195             200             205

gca cca gga gct acg tgg gct gca ttg att gga gat ttc aat aac tgg        792
Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn Asn Trp
                210             215             220

aat cct aat gca gat gtc atg act cag aat gag tgt ggt gtc tgg gag        840
Asn Pro Asn Ala Asp Val Met Thr Gln Asn Glu Cys Gly Val Trp Glu
                225             230             235

atc ttt ttg ccg aat aat gca gat ggt tca cca cca att ccc cat ggt        888
Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro His Gly
            240             245             250

tct cga gta aag ata cgc atg gat act cca tct ggc aac aaa gat tct        936
Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys Asp Ser
255                 260             265                 270

att cct gct tgg atc aag ttc tca gtt caa gca cca ggt gaa ctc cca        984
Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu Leu Pro
                275             280             285

tat aat ggc ata tac tat gat cct ccc gag gag gag aag tat gtg ttc       1032
Tyr Asn Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr Val Phe
            290             295             300

aaa aat cct cag cca aag aga cca aaa tca ctt cgg att tat gag tcg       1080
Lys Asn Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr Glu Ser
            305             310             315
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24

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cac gtt gga atg agt agt acg gag cca gta att aac aca tat gcc aac       1128
His Val Gly Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr Ala Asn
    320             325                 330

ttt aga gat gat gtg ctt cct cgc atc aaa aag ctt ggc tac aat gct       1176
Phe Arg Asp Asp Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala
335             340                 345                 350

gtt cag ctc atg gct att caa gag cat tca tat tat gct agt ttt ggg       1224
Val Gln Leu Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly
            355                 360                 365

tat cac gtc aca aac ttt tat gca gct agc agc cga ttt gga act cct       1272
Tyr His Val Thr Asn Phe Tyr Ala Ala Ser Ser Arg Phe Gly Thr Pro
            370                 375                 380

gat gat tta aag tcc cta gta gat aaa gct cac gag tta ggt ctt ctt       1320
Asp Asp Leu Lys Ser Leu Val Asp Lys Ala His Glu Leu Gly Leu Leu
            385                 390                 395

gtt ctc atg gat att gtt cat agc cat gca tca act aat acg ttg gat       1368
Val Leu Met Asp Ile Val His Ser His Ala Ser Thr Asn Thr Leu Asp
    400                 405                 410

ggg ctg aat atg ttt gat ggt acg gat ggt cac tac ttt cac tct gga       1416
Gly Leu Asn Met Phe Asp Gly Thr Asp Gly His Tyr Phe His Ser Gly
415             420                 425                 430


cca cgg ggt cat cat tgg atg tgg gac tct cgc ctt ttc aac tat ggg       1464
Pro Arg Gly His His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly
                435                 440                 445

agc tgg gag gtt cta agg ttt ctt ctt tca aat aca agg tgg tgg ttg       1512
Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Thr Arg Trp Trp Leu
            450                 455                 460

gat gag tac aag ttt gat ggg ttc aga ttt gat ggg gtg act tca atg       1560
Asp Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met
            465                 470                 475

atg tac acc cat cat gga ttg cag gta gat ttc acc ggc aac tac aat       1608
Met Tyr Thr His His Gly Leu Gln Val Asp Phe Thr Gly Asn Tyr Asn
    480                 485                 490

gaa tac ttt gga tat gca act gat gta gat gct gtg gtt tat ctg atg       1656
Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Val Tyr Leu Met
495                 500                 505                 510

ctg ttg aat gat atg att cat ggt ctc ttc cca gag gct gtc acc att       1704
Leu Leu Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val Thr Ile
                515                 520                 525

ggt gaa gat gtt agt gga atg cca aca gtt tgc att ccg gtt gaa gat       1752
Gly Glu Asp Val Ser Gly Met Pro Thr Val Cys Ile Pro Val Glu Asp
            530                 535                 540
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ggt ggt gtt ggc ttt gat tat cgt ctc cac atg gct gtt gct gat aaa      1800
Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Val Ala Asp Lys
        545             550             555

tgg gtt gag att att cag aag aga gat gaa gat tgg aaa atg ggt gac      1848
Trp Val Glu Ile Ile Gln Lys Arg Asp Glu Asp Trp Lys Met Gly Asp
        560             565             570

att gta cat atg ctg acc aac agg cgg tgg ttg gaa aag tgt gtt tct      1896
Ile Val His Met Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys Val Ser
575             580             585             590

tat gct gaa agt cat gac cag gcc ctt gtt ggt gac aaa act att gca      1944
Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr Ile Ala
                595             600             605

ttt tgg ctg atg gac aag gat atg tat gac ttc atg gct cgt gac aga      1992
Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Arg Asp Arg
            610             615             620

cca tct act cct ctt ata gat cgt gga ata gca ttg cac aaa atg atc      2040
Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His Lys Met Ile
        625             630             635

agg ctt att acc atg ggc tta ggc gga gaa gga tat ttg aat ttt atg      2088
Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met
        640             645             650

gga aat gaa ttt gga cat cct gag tgg att gat ttt cca aga ggg gat      2136
Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp
655             660             665             670

cga cat ctg ccc aat ggt aaa gta att cca ggg aac aac cac agt tat      2184
Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn His Ser Tyr
                675             680             685

gat aaa tgc cgt cgt aga ttt gat cta ggt gat gca gac tat cta aga      2232
Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr Leu Arg
            690             695             700

tat cat gga atg caa gag ttt gat cag gca atg caa cat ctt gaa gaa      2280
Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His Leu Glu Glu
            705             710             715

gcc tat ggt ttc atg act tct gag cac cag tat ata tca cgg aag gat      2328
Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp
        720             725             730

gaa gga gat cgg atc att gtc ttt gag agg gga aac ctt gtt ttt gta      2376
Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val
735             740             745             750

ttc aac ttt cat tgg act aac agc tat tca gat tac cga gtt ggc tgc      2424
Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg Val Gly Cys
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ttc aag tca gga aag tac aag att gtt ttg gac tcg gat gat ggc ttg   2472
Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Gly Leu
            770             775             780

ttt gga ggc ttc aac agg ctt agt cat gat gcc gag cac ttc acc ttt   2520
Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His Phe Thr Phe
            785             790             795

gac ggg tgg tat gat aac cgg cct cgg tcc ttc atg gta tat gca cca   2568
Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Ala Pro
        800             805             810

tct agg aca gca gtg gtc cat gct tta gta gaa gat gaa gag aat gaa   2616
Ser Arg Thr Ala Val Val His Ala Leu Val Glu Asp Glu Glu Asn Glu
815             820             825             830

gca gag aat gaa gta gaa agt gaa gtg aaa cca gcc tcc ggc           2658
Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser Gly
            835             840

tgagatagat atttagtaag aggatcccct aaagcaggaa tggttaacct gtgcatctgc 2718

attgaacgac gtatattgag acttgaattg atttgctgct caggacacag aatattaatt 2778

ccaaggctca aggcagagat acacgccata atgcatgatc atatgaaagc tccccaactt 2838

gtaaatcatt tagcaagctg cgtgcactct gtaaattata tgtagtactt tggcaagtca 2898

cgttattatg dataccatgg atgtccgcta ggaaaaattt tgtgtatacg cctactagga 2958

tttttaaatc tcgcatgttc cacataaagt ggtggttgaa tgttgcgcga ctatttttga 3018

gtaaaatgat tgaagttatt cttcacttgg gcctgtgaaa aaaaaaaaaa aaaaaa     3074
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<210> 40
<211> 42
<212> PRT
<213> Manihot esculenta

<400> 40

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Met Gln Leu Val Ala Ser Val Leu Thr Leu Ser Leu Thr Ser Gln Arg
 1               5                  10                  15

Asn Gly Thr Leu His His Ile Arg Asn Thr Phe Ser Leu Cys Ser Thr
            20                  25                  30

Pro Gln Ile Ser Ile Tyr Arg Leu Pro Trp
        35                  40
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<210> 41
<211> 2223
<212> DNA

<213> Manihot esculenta

<400> 41
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tgatcgaagg acctcctctt gcctttcctt caacttcaag aaggcggcgt tttctaggag 180
ggtcttctct ggaaagtcat ctcatgaatc tgactcctca aatgtaatgg tcactgcgtc 240
taaaagagtc cttcctgatg gtcggattga atgctattct tcttcaacag atcaattgga 300
agccctggc acagtttcag aagaatccca ggtgcttact gatgttgaga gtctcattat 360
ggatgataag attgttgaag atgaagtaaa taaagaatct gttccaatgc gggagacagt 420
tagcatcgga aaaattggat ctaaaccaag gtccattcct ccacccggca gagggcaaag 480
aatatatgac atagatccaa gcttgacagg ctttcgtcaa cacctagatt accggtattc 540
acagtacaaa agactccgag aagaaattga caagtatgaa ggtagtctgg atgcattttc 600
tcgtggctat gaaaagtttg gtttctcacg cagtgaaaca ggaataactt atagagagtg 660
ggcaccagga gctacgtggg ctgcattgat tggagatttc aataactgga atcctaatgc 720
agatgtcatg actcagaatg agtgtggtgt ctgggagatc tttttgccga ataatgcaga 780
tggttcacca ccaattcccc atggttctcg agtaaagata cgcatggata ctccatctgg 840
caacaaagat tctattcctg cttggatcaa gttctcagtt caagcaccag gtgaactccc 900
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cggagaagga tatttgaatt ttatgggaaa tgaatttgga catcctgagt ggattgattt 2040
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tgataaatgc cgtcgtagat ttgatctagg tgatgcagac tatctaagat atcatggaat 2160
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gca                                                                 2223
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<210> 42
<211> 2224
<212> DNA
<213> Manihot esculenta

<400> 42
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cgatcggagg acctcctctt gcctttcctt caacttcaag aaggaggcgt tttctaggag 180
ggtcttctct ggaaagtcat ctcatgaatc tgactcctca aatgtaatgg tcactgcgtc 240
taaaagagtc cttcctgatg gtcggattga atgctattct tcttcaacag atcaattgga 300
agccctggc acagtttcag aagaatccca ggtgcttact gatgttgaga gtctcattat 360
ggatgataag attgttgaag atgaagtaaa taaagaatct gttccaatgc gggagacagt 420
tagcatcaga aaaattggat ctaaaccaag gtccattcct ccacccggca gagggcaaag 480
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tcgtggctat gaaaagtttg gtttctcacg cagtgaaaca ggaataactt atagagagtg 660
ggcaccagga gctacgtggg ctgcattgat tggagatttc aataactgga atcctaatgc 720
agatgtcatg actcagaatg agtgtggcgt ctgggagatc tttttgccga ataatgcaga 780
tggttcacca ccaattcccc atggttctcg agtaaagata tgcatggata ctccatctgg 840
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tggctacaat gctgttcagc tcatggctat tcaagagcat tcatattatg ctagttttgg 1140
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cggagaagga tatttgaatt ttatgggaaa tgaatttgga caccccgagt ggattgattt 2040
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<210> 43
<211> 2223
<212> DNA
<213> Manihot esculenta

<400> 43
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tgatcgaagg acctcctctt gcctttcctt caacttcaag aaggcggcgt tttctaggag 180
ggtcttctct agaaagtcat ctcatgaatc tgactcctca aatgtaatgg tcactgcgtc 240
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ggatgataag attgttgaag atgaagtaaa taaagaatct gttccaatgc gggagacagt 420
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gccaaagaga ccaaaatcac ttcggattta tgagtcgcac gttggaatga gtagtacgga 1020
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gca                                                               2223


<210> 44
<211> 1394
<212> DNA
<213> Manihot esculenta

<400> 44
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agttggctgc ttaaagccag gaaagtacaa gatagtcttg gattcagatg atcctttgtt 1260
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agtagaagat gaag                                                   1394


<210> 45
<211> 1394
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<212> DNA
<213> Manihot esculenta

<400> 45
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tagtcactac ttccactccg gatcacgggg tcatcattgg ttgtgggact ctcgcctttt 240
caactatgga agctgggagg tgctaagatt tcttctttca aatgcaagat ggtggttgga 300
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tggtgttgga tttgattacc gtctccacat ggccattgcc gataaatgga ttgagattct 600
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aactattgca ttttggctga tggacaagga catgtacgac ttcatggctc gtgacagacc 780
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agtagaagat gaag 1394


<210> 46
<211> 474
<212> PRT
<213> Manihot esculenta


<400> 46
Ser Phe Gly Tyr His Val Thr Asn Phe Tyr Ala Ala Ser Ser Arg Phe
1               5                   10                  15


Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu
            20                  25                  30


Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Thr
        35                  40                  45


Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Pro His Tyr Phe
    50                  55                  60


His Ser Gly Ser Arg Gly His His Trp Met Trp Asp Ser Arg Leu Phe
65                  70                  75                  80


Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg
                85                  90                  95


Trp Trp Leu Asp Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val
            100                 105                 110


31

Thr Ser Met Met Tyr Thr His His Gly Leu Gln Val Asp Phe Thr Gly
     115                 120                 125

Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Val
     130                 135            140

Tyr Leu Met Leu Leu Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala
145              150            155           160

Val Thr Ile Gly Glu Asp Val Ser Gly Met Pro Thr Val Cys Ile Pro
            165            170           175

Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Val
            180            185          190

Ala Asp Lys Trp Val Glu Ile Ile Gln Lys Arg Asp Glu Asp Trp Lys
            195            200          205

Met Gly Asp Ile Val His Met Leu Thr Asn Arg Arg Trp Leu Glu Lys
     210                 215           220

Cys Val Ser Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
225              230            235          240

Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
            245            250          255

Leu Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Val Ala Leu His
            260            265          270

Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
            275            280          285

Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
     290                 295           300

Arg Gly Asp Leu His Leu Pro Ser Gly Lys Phe Val Pro Gly Asn Asn
305              310            315          320

Tyr Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Asn Ser
            325            330          335

Lys His Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Ile Gln His
            340            345          350

Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser
            355            360          365

Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu
            370            375          380

Val Phe Val Phe Asn Phe His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg
385              390            395          400

Val Gly Cys Leu Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
            405            410          415

Asp Pro Leu Phe Gly Gly Phe Gly Arg Leu Ser His Asp Ala Glu His
        420               425               430

Phe Ser Phe Glu Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val
        435               440               445

Tyr Thr Pro Cys Arg Thr Ala Val Val Tyr Ala Leu Val Glu Asp Glu
    450               455               460

Val Glu Asn Glu Val Glu Pro Val Ala Gly
465               470


<210> 47
<211> 474
<212> PRT
<213> Manihot esculenta

<400> 47
Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe
    1               5               10              15

Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu
            20              25              30

Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn
            35              40              45

Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe
        50              55              60

His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe
    65              70              75              80

Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg
                85              90              95

Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val
            100             105             110

Thr Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly
            115             120             125

Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile
    130             135             140

Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala
145             150             155             160

Val Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro
                165             170             175

Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile
            180             185             190

Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys

33

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          195                     200                     205
Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys
    210                     215                     220

Cys Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
225                     230                     235                 240

Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
                245                     250                     255

Arg Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His
                260                     265                     270

Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
                275                     280                     285

Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
    290                     295                     300

Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn
305                     310                     315                 320

His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
                325                     330                     335

Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His
                340                     345                     350

Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser
                355                     360                     365

Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu
                370                     375                     380

Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg
385                     390                     395                 400

Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
                405                     410                     415

Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His
                420                     425                     430

Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val
                435                     440                     445

Tyr Ala Pro Ser Arg Thr Ala Val Val His Ala Leu Val Glu Asp Glu
    450                     455                     460

Glu Asn Glu Ala Glu Asn Glu Val Glu Ser
465                     470
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<210> 48
<211> 1069


34

<212> DNA
<213> Manihot esculenta

<220>
<221> CDS
<222> (1)..(684)

<400> 48
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atg gac aag gat atg tat gac ttc atg gct ctt gac aga cca tct act    48
Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu Asp Arg Pro Ser Thr
 1               5                  10                  15

cct ctc ata gat cgt gga gta gca ttg cac aaa atg atc agg ctt att    96
Pro Leu Ile Asp Arg Gly Val Ala Leu His Lys Met Ile Arg Leu Ile
            20                  25                  30

acc atg gga tta ggc gga gaa gga tat ttg aat ttt atg gga aat gaa   144
Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn Glu
        35                  40                  45

ttt gga cac ccc gag tgg att gat ttt cca aga ggt gat cta cat ctt   192
Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp Leu His Leu
    50                  55                  60

ccc agt ggt aaa ttt gtt cct ggg aac aat tac agt tat gat aaa tgc   240
Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr Ser Tyr Asp Lys Cys
65                  70                  75                  80

cgg cgt agg ttt gat cta ggc aat tca aag cgt ctg aga tat cat gga   288
Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys Arg Leu Arg Tyr His Gly
                85                  90                  95

atg caa gag ttt gat caa gca att cag cat ctt gaa gaa gcc tat ggt   336
Met Gln Glu Phe Asp Gln Ala Ile Gln His Leu Glu Glu Ala Tyr Gly
               100                 105                 110

ttc atg act tct gag cac caa tac ata tca cgg aag gat gaa agg gat   384
Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp Glu Arg Asp
        115                 120                 125

cgg atc att gtc ttc gag agg gga aac ctc gtt ttt gta ttc aat ttt   432
Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val Phe Asn Phe
    130                 135                 140

cat tgg act agc agc tat tcg gat tac cga gtt ggc tgc tta aag cca   480
His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg Val Gly Cys Leu Lys Pro
145                 150                 155                 160

gga aag tac aag ata gtc ttg gat tca gat gat cct ttg ttt gga ggc   528
Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Pro Leu Phe Gly Gly
               165                 170                 175

ttt ggc agg ctt agt cat gat gca gag cac ttc agc ttt gaa ggg tgg   576
Phe Gly Arg Leu Ser His Asp Ala Glu His Phe Ser Phe Glu Gly Trp
               180                 185                 190

tac gat aac cgg cct cga tcc ttc atg gtg tac aca cca tgt aga aca   624
```

```
Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Thr Pro Cys Arg Thr
        195                 200                 205

gca gtg gtc tat gct tta gtg gag gat gaa gtg gag aat gaa gtg gaa    672
Ala Val Val Tyr Ala Leu Val Glu Asp Glu Val Glu Asn Glu Val Glu
    210                 215                 220

cct gtc gcc ggt taagatatat cttagcaaca ggttctgaag caggaatgcc       724
Pro Val Ala Gly
225

attattgatc ttcctatgtg catctgcgtt gaacgaaata tattgagcct ataatttgat 784

gtcacggtcc ttgcagattt ccatcctggt tcttggtatt ttgttgtcat gataaacata 844

atcaaagacc aataggaaac gcagggttac atgctagctt ccatcatcat agggagctca 904

gacctcctaa accataaatc ttcaagctgc ctgcgttcgg tagtatgtta tgtggtactt 964

tgcaatctta aattatcatg atcgctgtgg atgctaacta tgacaatttt gtatatatgc 1024

caacgaggat tttaagtttt aaaaaaaaaa caaaaaaaat ccatg                 1069


<210> 49
<211> 228
<212> PRT
<213> Manihot esculenta

<400> 49
Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu Asp Arg Pro Ser Thr
  1               5                   10                  15

Pro Leu Ile Asp Arg Gly Val Ala Leu His Lys Met Ile Arg Leu Ile
            20                  25                  30

Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn Glu
            35                  40                  45

Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp Leu His Leu
    50                  55                  60

Pro Ser Gly Lys Phe Val Pro Gly Asn Asn Tyr Ser Tyr Asp Lys Cys
65                  70                  75                  80

Arg Arg Arg Phe Asp Leu Gly Asn Ser Lys Arg Leu Arg Tyr His Gly
                85                  90                  95

Met Gln Glu Phe Asp Gln Ala Ile Gln His Leu Glu Glu Ala Tyr Gly
            100                 105                 110

Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp Glu Arg Asp
        115                 120                 125

Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val Phe Asn Phe
    130                 135                 140
```

36

```
His Trp Thr Ser Ser Tyr Ser Asp Tyr Arg Val Gly Cys Leu Lys Pro
145             150             155             160

Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Pro Leu Phe Gly Gly
            165             170             175

Phe Gly Arg Leu Ser His Asp Ala Glu His Phe Ser Phe Glu Gly Trp
        180             185             190

Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Thr Pro Cys Arg Thr
        195             200             205

Ala Val Val Tyr Ala Leu Val Glu Asp Glu Val Glu Asn Glu Val Glu
    210             215             220

Pro Val Ala Gly
225


<210> 50
<211> 1921
<212> DNA
<213> Manihot esculenta

<220>
<221> CDS
<222> (61)..(1503)

<400> 50
tatggattga catcgataat acgactcact atagggattt tttttttttt ttttttttgt 60

agt ttt ggg tac cat gtc aca aac ttt ttt gca cct agc agc cga ttt    108
Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe
 1               5               10              15

gga act cct gat gat ttg aag tct tta ata gat aaa gct cat gag tta    156
Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu
            20              25              30

ggg ctg ctt gtt ctc atg gat att gtt cat agc cat gcg tca aat aat    204
Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn
        35              40              45

acg ttg gat ggg ctg aac atg ttt gat ggt acg gat agt cac tac ttc    252
Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe
    50              55              60

cac tcc gga tca cgg ggt cat cat tgg ttg tgg gac tct cgc ctt ttc    300
His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe
65              70              75              80

aac tat gga agc tgg gag gtg cta aga ttt ctt ctt tca aat gca aga    348
Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg
                85              90              95

tgg tgg ttg gaa gag tac agg ttt gat ggt ttt aga ttt gat ggg gtg    396
Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val
```

37

```
              100                      105                      110
act tcc atg atg tac act ccc cat ggg ttg cag gta gct ttt act ggc   444
Thr Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly
        115                 120                 125

aac tac aat gag tac ttt gga tat gca act gat gta gat gct gtg att   492
Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile
        130                 135                 140

tat ttg atg ctt gtg aat gat atg att cac ggt ctt ttc cct gag gct   540
Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala
145                 150                 155                 160

gtt acc att ggt gaa gat gtt agc gga aag cca aca ttt tgc att cca   588
Val Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro
                165                 170                 175

gtg gaa gat ggt ggt gtt gga ttt gat tac cgt ctc cac atg gcc att   636
Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile
                180                 185                 190

gcc gat aaa tgg att gag att ctt aag aag aga gat gag gac tgg aaa   684
Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys
                195                 200                 205

atg ggt gac att gtg cat aca ctc acc aac aga agg tgg ttg gaa aaa   732
Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys
        210                 215                 220

tgt gtt gct tat gct gaa agt cat gac caa gct ctt gtt ggt gac aaa   780
Cys Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
225                 230                 235                 240

act att gca ttt tgg ctg atg gac aag gac atg tac gac ttc atg gct   828
Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
                245                 250                 255

cgt gac aga cca tct act cct ctt ata gat cgt gga ata gca ttg cac   876
Arg Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His
                260                 265                 270

aaa atg atc agg ctt att acc atg ggc tta ggc gga gaa gga tat ttg   924
Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
                275                 280                 285

aat ttt atg gga aat gaa ttt gga cat cct gag tgg att gat ttt cca   972
Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
        290                 295                 300

aga ggg gat cga cat ctg ccc aat ggt aaa gta att cca ggg aac aac   1020
Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn
305                 310                 315                 320

cac agt tat gat aaa tgc cgt cgt aga ttt gat cta ggt gat gca gac   1068
His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
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38

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                325                   330                   335

tat cta aga tat cat gga atg caa gag ttt gat cag gca atg caa cat    1116
Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His
            340                   345                   350

ctt gaa gaa gcc tat ggt ttc atg act tct gag cac cag tat ata tca    1164
Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser
            355                   360                   365

cgg aag gat gaa gga gat cgg atc att gtc ttt gag agg gga aac ctt    1212
Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu
            370                   375                   380

gtt ttt gta ttc aac ttt cat tgg act aac agc tat tca gat tac cga    1260
Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg
385                   390                   395                   400

gtt ggc tgc ttc aag tca gga aag tac aag att gtt ttg gac tcg gat    1308
Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
                405                   410                   415

gat ggc ttg ttt gga ggc ttc aac agg ctt agt cat gat gcc gag cac    1356
Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His
            420                   425                   430

ttc acc ttt gac ggg tgg tat gat aac cgg cct cgg tcc ttc atg gta    1404
Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val
            435                   440                   445

tat gca cca tct agg aca gca gtg gtc cat gct tta gta gaa gat gaa    1452
Tyr Ala Pro Ser Arg Thr Ala Val Val His Ala Leu Val Glu Asp Glu
            450                   455                   460

gag aat gaa gca gag aat gaa gta gaa agt gaa gtg aaa cca gcc tcc    1500
Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser
465                   470                   475                   480

ggc tgagatagat atttagtaag aggatcccct aaagcaggaa tggttaacct         1553
Gly

gtgcatctgc attgaacgac gtatattgag acttgaattg atttgctgct caggacacag 1613

aatattaatt ccaaggctca aggcagagat acacgccatg atgcatgatc atatgaaagc 1673

tccccaactt gtaaatcatt tagcaagctg cgtgcactct gtaaattata tgtagtactt 1733

tggcaagtca cgttattatg dataccatgg atgtccgcta ggaaaaattt tgtgtatacg 1793

cctactagga ttttaaatc tcgcatgttc cacataaagt ggtggttgaa tgttgcgcga 1853

ctattttga gtaaaatgat tgaagttatt cttcacttgg gcctgtgaaa aaaaaaaaaa 1913

aaaaaaaa                                                          1921
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<210> 51

<211> 481
<212> PRT
<213> Manihot esculenta

<400> 51

Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe
1               5                   10                  15

Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu
            20                  25                  30

Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn
            35                  40                  45

Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe
        50                  55                  60

His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe
65                  70                  75                  80

Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg
                85                  90                  95

Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val
            100                 105                 110

Thr Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly
            115                 120                 125

Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile
    130                 135                 140

Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala
145                 150                 155                 160

Val Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro
                165                 170                 175

Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile
            180                 185                 190

Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys
        195                 200                 205

Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys
    210                 215                 220

Cys Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
225                 230                 235                 240

Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
                245                 250                 255

Arg Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His
            260                 265                 270

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Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
    275                 280                 285

Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
    290                 295                 300

Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn
305                 310                 315                 320

His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
                325                 330                 335

Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His
                340                 345                 350

Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser
    355                 360                 365

Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu
    370                 375                 380

Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg
385                 390                 395                 400

Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
                405                 410                 415

Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His
                420                 425                 430

Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val
                435                 440                 445

Tyr Ala Pro Ser Arg Thr Ala Val Val His Ala Leu Val Glu Asp Glu
    450                 455                 460

Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser
465                 470                 475                 480

Gly
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<210> 52
<211> 2805
<212> DNA
<213> Manihot esculenta

<220>
<221> CDS
<222> (131)..(2674)

<400> 52
agtgaattcg agctcggtac ccggggatcc gattcgcatt tctcgctatt gctttccgtt   60

tatttccata tataaaatat caaatctaat cacttgcgcc atttctatct ctctccaaac  120

tctcaccgaa atg gta tac tac act gta tca ggc ata cgt ttt cct tgt       169

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                    Met Val Tyr Tyr Thr Val Ser Gly Ile Arg Phe Pro Cys
                     1               5                   10

gca cct tca ctc tac aaa tct cag ctc acc agc ttc cat ggc ggt cga    217
Ala Pro Ser Leu Tyr Lys Ser Gln Leu Thr Ser Phe His Gly Gly Arg
     15                  20                  25

agg acc tct tct ggc ctt tcc ttc ctc ttg aag aag gag ctg ttt cct    265
Arg Thr Ser Ser Gly Leu Ser Phe Leu Leu Lys Lys Glu Leu Phe Pro
 30                  35                  40                  45

cgg aag atc ttt gct gga aag tcc tct tat gaa tct gac tcc tca aat    313
Arg Lys Ile Phe Ala Gly Lys Ser Ser Tyr Glu Ser Asp Ser Ser Asn
                 50                  55                  60

tta act gtc tct gca tct gag aag gtc ctt gtt cct gat gat cag att    361
Leu Thr Val Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile
                 65                  70                  75

gat ggc tct tct tct tca aca tat caa tta gaa acc act ggc aca gtt    409
Asp Gly Ser Ser Ser Ser Thr Tyr Gln Leu Glu Thr Thr Gly Thr Val
                 80                  85                  90

ttg gag gaa tcc cag gtt ctt ggt gat gca gag agt ctt gtg atg gaa    457
Leu Glu Glu Ser Gln Val Leu Gly Asp Ala Glu Ser Leu Val Met Glu
     95                  100                 105

gat gat aag aat gtt gag gag gat gaa gta aaa aaa gag tcg gtt cca    505
Asp Asp Lys Asn Val Glu Glu Asp Glu Val Lys Lys Glu Ser Val Pro
110                 115                 120                 125

ttg cat gag aca att agc att gga aaa agt gaa tct aaa cca agg tcc    553
Leu His Glu Thr Ile Ser Ile Gly Lys Ser Glu Ser Lys Pro Arg Ser
                 130                 135                 140

att cct cca cct ggc agt ggg cag aga ata tat gac ata gat cca agc    601
Ile Pro Pro Pro Gly Ser Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser
                 145                 150                 155

ttg gca ggt ttc cgt cag cat ctt gac tac cga tat tca cag tac aaa    649
Leu Ala Gly Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys
         160                 165                 170

agg ctg cgt gag gaa att gac aag tat gaa ggt ggt ttg gat gca ttc    697
Arg Leu Arg Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe
     175                 180                 185

tct cgt gga ttt gaa aag ttt ggt ttc tta cgc agt gaa aca gga ata    745
Ser Arg Gly Phe Glu Lys Phe Gly Phe Leu Arg Ser Glu Thr Gly Ile
190                 195                 200                 205

act tat agg gaa tgg gca cct gga gct acg tgg gct gca ctt att gga    793
Thr Tyr Arg Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly
                 210                 215                 220

gat ttc aac aat tgg aat cct aat gca gat gtc atg act cgg aat gag    841
Asp Phe Asn Asn Trp Asn Pro Asn Ala Asp Val Met Thr Arg Asn Glu
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42

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                225                      230                      235

ttt ggt gtc tgg gag att ttt ttg cca aat aac gca gat ggt tca cca    889
Phe Gly Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro
        240                 245                 250

cca att cct cat ggt tct cga gta aag ata cgc atg gat act cca tct    937
Pro Ile Pro His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser
        255                 260                 265

ggc atc aaa gat tca att cct gct tgg atc aag ttc tca gtt cag gca    985
Gly Ile Lys Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala
270                 275                 280                 285

cct ggt gaa atc cca tac aat gcc ata tac tat gat cca cca aag gag   1033
Pro Gly Glu Ile Pro Tyr Asn Ala Ile Tyr Tyr Asp Pro Pro Lys Glu
                290                 295                 300

gag aag tat gtg ttc aaa cat cct cag cca aag aga cca aaa tca ctt   1081
Glu Lys Tyr Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu
                305                 310                 315

agg att tat gaa tct cat gtt ggg atg agt agt atg gag cca ata att   1129
Arg Ile Tyr Glu Ser His Val Gly Met Ser Ser Met Glu Pro Ile Ile
        320                 325                 330

aac aca tat gcc aac ttt aga gat gat atg ctt cct cgc atc aaa aag   1177
Asn Thr Tyr Ala Asn Phe Arg Asp Asp Met Leu Pro Arg Ile Lys Lys
        335                 340                 345

ctt ggc tac aat gct gtt cag atc atg gct att caa gag cat tcc tat   1225
Leu Gly Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr
350                 355                 360                 365

tat gct agt ttt ggg tac cat gtc aca aac ttt ttt gca cct agc agc   1273
Tyr Ala Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser
                370                 375                 380

cga ttt gga act cct gat gat ttg aag tct tta ata gat aaa gct cat   1321
Arg Phe Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His
                385                 390                 395

gag tta ggg ctg ctt gtt ctc atg gat att gtt cat agc cat gcg tca   1369
Glu Leu Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser
                400                 405                 410



aat aat acg ttg gat ggg ctg aac atg ttt gat ggt acg gat agt cac   1417
Asn Asn Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His
        415                 420                 425

tac ttc cac tcc gga tca cgg ggt cat cat tgg ttg tgg gac tct cgc   1465
Tyr Phe His Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg
430                 435                 440                 445

ctt ttc aac tat gga agc tgg gag gtg cta aga ttt ctt ctt tca aat   1513
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43

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Leu Phe Asn Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn
            450                 455                 460

gca aga tgg tgg ttg gaa gag tac agg ttt gat ggt ttt aga ttt gat    1561
Ala Arg Trp Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp
            465                 470                 475

ggg gtg act tcc atg atg tac act ccc cat ggg ttg cag gta gct ttt    1609
Gly Val Thr Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe
            480                 485                 490

act ggc aac tac aat gag tac ttt gga tat gca act gat gta gat gct    1657
Thr Gly Asn Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala
            495                 500                 505

gtg att tat ttg atg ctt gtg aat gat atg att cac ggt ctt ttc cct    1705
Val Ile Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro
510                 515                 520                 525

gag gct gtt acc att ggt gaa gat gtt agc gga aag cca aca ttt tgc    1753
Glu Ala Val Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys
                530                 535                 540

att cca gtg gaa gat ggt ggt gtt gga ttt gat tac cgt ctc cac atg    1801
Ile Pro Val Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met
                545                 550                 555

gcc att gcc gat aaa tgg att gag att ctt aag aag aga gat gag gac    1849
Ala Ile Ala Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp
            560                 565                 570

tgg aaa atg ggt gac att gtg cat aca ctc acc aac aga agg tgg ttg    1897
Trp Lys Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu
            575                 580                 585

gaa aaa tgt gtt gct tat gct gaa agt cat gac caa gct ctt gtt ggt    1945
Glu Lys Cys Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly
590                 595                 600                 605

gac aaa act att gca ttt tgg ctg atg gac aag gac atg tac gac ttc    1993
Asp Lys Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe
                610                 615                 620

atg gct cgt gac aga cca tct act cct ctt ata gat cgt gga ata gca    2041
Met Ala Arg Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala
                625                 630                 635

ttg cac aaa atg atc agg ctt att acc atg ggc tta ggc gga gaa gga    2089
Leu His Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly
            640                 645                 650

tat ttg aat ttt atg gga aat gaa ttt gga cat cct gag tgg att gat    2137
Tyr Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp
            655                 660                 665
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44

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ttt cca aga ggg gat cga cat ctg ccc aat ggt aaa gta att cca ggg    2185
Phe Pro Arg Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly
670             675             680             685

aac aac cac agt tat gat aaa tgc cgt cgt aga ttt gat cta ggt gat    2233
Asn Asn His Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp
                690             695             700

gca gac tat cta aga tat cat gga atg caa gag ttt gat cag gca atg    2281
Ala Asp Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met
            705             710             715

caa cat ctt gaa gaa gcc tat ggt ttc atg act tct gag cac cag tat    2329
Gln His Leu Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr
            720             725             730

ata tca cgg aag gat gaa gga gat cgg atc att gtc ttt gag agg gga    2377
Ile Ser Arg Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly
        735             740             745

aac ctt gtt ttt gta ttc aac ttt cat tgg act aac agc tat tca gat    2425
Asn Leu Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp
750             755             760             765

tac cga gtt ggc tgc ttc aag tca gga aag tac aag att gtt ttg gac    2473
Tyr Arg Val Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp
                770             775             780

tcg gat gat ggc ttg ttt gga ggc ttc aac agg ctt agt cat gat gcc    2521
Ser Asp Asp Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala
            785             790             795

gag cac ttc acc ttt gac ggg tgg tat gat aac cgg cct cgg tcc ttc    2569
Glu His Phe Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe
            800             805             810

atg gta tat gca cca tct agg aca gca gtg gtc tat gct tta gta gaa    2617
Met Val Tyr Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Val Glu
        815             820             825

gat gaa gag aat gaa gca gag aat gaa gta gaa agt gaa gtg aaa cca    2665
Asp Glu Glu Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro
830             835             840             845

gcc tcc ggc tgagatagat atttagtaag aggatcccct aaagcaggaa          2714
Ala Ser Gly

tggttaacct gtgcatctgc attgaacgac gtatattgag actggaaatc catatgacta 2774

gtagatcctc tagagtcgac ctgcaggcat g                                2805

<210> 53
<211> 848
<212> PRT
<213> Manihot esculenta

<400> 53
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```
Met Val Tyr Tyr Thr Val Ser Gly Ile Arg Phe Pro Cys Ala Pro Ser
 1               5                  10              15

Leu Tyr Lys Ser Gln Leu Thr Ser Phe His Gly Gly Arg Arg Thr Ser
            20                  25                  30

Ser Gly Leu Ser Phe Leu Leu Lys Lys Glu Leu Phe Pro Arg Lys Ile
            35                  40                  45

Phe Ala Gly Lys Ser Ser Tyr Glu Ser Asp Ser Ser Asn Leu Thr Val
        50                  55                  60

Ser Ala Ser Glu Lys Val Leu Val Pro Asp Asp Gln Ile Asp Gly Ser
 65                 70                  75                  80

Ser Ser Ser Thr Tyr Gln Leu Glu Thr Thr Gly Thr Val Leu Glu Glu
                85                  90                  95

Ser Gln Val Leu Gly Asp Ala Glu Ser Leu Val Met Glu Asp Asp Lys
            100                 105                 110

Asn Val Glu Glu Asp Glu Val Lys Lys Glu Ser Val Pro Leu His Glu
            115                 120                 125

Thr Ile Ser Ile Gly Lys Ser Glu Ser Lys Pro Arg Ser Ile Pro Pro
    130                 135                 140

Pro Gly Ser Gly Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Ala Gly
145                 150                 155                 160

Phe Arg Gln His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg
            165                 170                 175

Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe Ser Arg Gly
            180                 185                 190

Phe Glu Lys Phe Gly Phe Leu Arg Ser Glu Thr Gly Ile Thr Tyr Arg
            195                 200                 205

Glu Trp Ala Pro Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn
    210                 215                 220

Asn Trp Asn Pro Asn Ala Asp Val Met Thr Arg Asn Glu Phe Gly Val
225                 230                 235                 240

Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro
            245                 250                 255

His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Ile Lys
            260                 265                 270

Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu
            275                 280                 285

Ile Pro Tyr Asn Ala Ile Tyr Tyr Asp Pro Pro Lys Glu Glu Lys Tyr
    290                 295                 300
```

46

```
Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr
305                 310             315                 320

Glu Ser His Val Gly Met Ser Ser Met Glu Pro Ile Ile Asn Thr Tyr
                325             330                 335

Ala Asn Phe Arg Asp Asp Met Leu Pro Arg Ile Lys Lys Leu Gly Tyr
            340             345                 350

Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser
            355             360             365

Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe Gly
    370             375             380

Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly
385             390             395                 400

Leu Leu Val Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn Thr
            405             410                 415

Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ser His Tyr Phe His
            420             425             430

Ser Gly Ser Arg Gly His His Trp Leu Trp Asp Ser Arg Leu Phe Asn
    435             440                 445

Tyr Gly Ser Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp
    450             455             460

Trp Leu Glu Glu Tyr Arg Phe Asp Gly Phe Arg Phe Asp Gly Val Thr
465             470             475                 480

Ser Met Met Tyr Thr Pro His Gly Leu Gln Val Ala Phe Thr Gly Asn
            485             490                 495

Tyr Asn Glu Tyr Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Ile Tyr
            500             505                 510

Leu Met Leu Val Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val
    515             520             525

Thr Ile Gly Glu Asp Val Ser Gly Lys Pro Thr Phe Cys Ile Pro Val
    530             535             540

Glu Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile Ala
545             550             555                 560

Asp Lys Trp Ile Glu Ile Leu Lys Lys Arg Asp Glu Asp Trp Lys Met
            565             570                 575


Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys
            580             585                 590

Val Ala Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr
    595             600             605
```

```
Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Arg
    610                 615                 620

Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His Lys
625                 630                 635                 640

Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn
                645                 650                 655

Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg
            660                 665                 670

Gly Asp Arg His Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn His
        675                 680                 685

Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr
    690                 695                 700

Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln His Leu
705                 710                 715                 720

Glu Glu Ala Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg
            725                 730                 735

Lys Asp Glu Gly Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val
        740                 745                 750

Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg Val
    755                 760                 765

Gly Cys Phe Lys Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp
    770                 775                 780

Gly Leu Phe Gly Gly Phe Asn Arg Leu Ser His Asp Ala Glu His Phe
785                 790                 795                 800

Thr Phe Asp Gly Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr
            805                 810                 815

Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Val Glu Asp Glu Glu
        820                 825                 830

Asn Glu Ala Glu Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser Gly
        835                 840                 845
```

<210> 54
<211> 879
<212> PRT
<213> Solanum tuberosum


<400> 54
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Met Val Tyr Thr Leu Ser Gly Val Arg Phe Pro Thr Val Pro Ser Val
  1               5                 10                15
```

```
Tyr Lys Ser Asn Gly Phe Ser Ser Asn Gly Asp Arg Arg Asn Ala Asn
            20              25                  30

Val Ser Val Phe Leu Lys Lys His Ser Leu Ser Arg Lys Ile Leu Ala
            35              40                  45

Glu Lys Ser Ser Tyr Asn Ser Glu Phe Arg Pro Ser Thr Val Ala Ala
        50              55                  60

Ser Gly Lys Val Leu Val Pro Gly Thr Gln Ser Asp Ser Ser Ser Ser
65              70                  75                      80

Ser Thr Asp Gln Phe Glu Phe Thr Glu Thr Ser Pro Glu Asn Ser Pro
                85                  90                  95

Ala Ser Thr Asp Val Asp Ser Ser Thr Met Glu His Ala Ser Gln Ile
            100             105                 110

Lys Thr Glu Asn Asp Asp Val Glu Pro Ser Ser Asp Leu Thr Gly Ser
        115             120                 125

Val Glu Glu Leu Asp Phe Ala Ser Ser Leu Gln Leu Gln Glu Gly Gly
    130             135                 140

Lys Leu Glu Glu Ser Lys Thr Leu Asn Thr Ser Glu Glu Thr Ile Ile
145             150                 155                     160

Asp Glu Ser Asp Arg Ile Arg Glu Arg Gly Ile Pro Pro Pro Gly Leu
            165                 170                 175

Gly Gln Lys Ile Tyr Glu Ile Asp Pro Leu Leu Thr Asn Tyr Arg Gln
            180                 185                 190

His Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Lys Leu Arg Glu Ala Ile
            195                 200                 205

Asp Lys Tyr Glu Gly Gly Leu Glu Ala Phe Ser Arg Gly Tyr Glu Lys
    210                 215                 220

Met Gly Phe Thr Arg Ser Ala Thr Gly Ile Thr Tyr Arg Glu Trp Ala
225                 230                 235                     240

Leu Gly Ala Gln Ser Ala Ala Leu Ile Gly Asp Phe Asn Asn Trp Asp
            245                 250                 255

Ala Asn Ala Asp Ile Met Thr Arg Asn Glu Phe Gly Val Trp Glu Ile
            260                 265                 270

Phe Leu Pro Asn Asn Val Asp Gly Ser Pro Ala Ile Pro His Gly Ser
        275                 280                 285

Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Val Lys Asp Ser Ile
    290                 295                 300

Pro Ala Trp Ile Asn Tyr Ser Leu Gln Leu Pro Asp Glu Ile Pro Tyr
305                 310                 315                     320
```

49

```
Asn Gly Ile His Tyr Asp Pro Pro Glu Glu Glu Arg Tyr Ile Phe Gln
            325                 330                 335

His Pro Arg Pro Lys Lys Pro Lys Ser Leu Arg Ile Tyr Glu Ser His
            340                 345                 350

Ile Gly Met Ser Ser Pro Glu Pro Lys Ile Asn Ser Tyr Val Asn Phe
            355                 360                 365

Arg Asp Glu Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala Leu
    370                 375                 380

Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly Tyr
385                 390                 395                 400

His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe Gly Thr Pro Asp
            405                 410                 415

Asp Leu Lys Ser Leu Ile Asp Lys Ala His Glu Leu Gly Ile Val Val
            420                 425                 430

Leu Met Asp Ile Val His Ser His Ala Ser Asn Asn Thr Leu Asp Gly
            435                 440                 445

Leu Asn Met Phe Asp Cys Thr Asp Ser Cys Tyr Phe His Ser Gly Ala
    450                 455                 460

Arg Gly Tyr His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly Asn
465                 470                 475                 480

Trp Glu Val Leu Arg Tyr Leu Leu Ser Asn Ala Arg Trp Ala Leu Asp
            485                 490                 495

Ala Phe Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met Met
            500                 505                 510

Tyr Ile His His Gly Leu Ser Val Gly Phe Thr Gly Asn Tyr Glu Glu
            515                 520                 525

Tyr Phe Gly Leu Ala Thr Asp Val Asp Ala Val Val Tyr Leu Met Leu
            530                 535                 540

Val Asn Asp Leu Ile His Gly Leu Pro Pro Asp Ala Ile Thr Ile Gly
545                 550                 555                 560

Glu Asp Val Ser Gly His Pro Thr Phe Cys Asp Pro Val Gln Glu Gly
            565                 570                 575

Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile Ala Asp Lys Arg
            580                 585                 590

Ile Glu Leu Leu Lys Lys Arg Asp Glu Asp Trp Arg Val Gly Asp Ile
            595                 600                 605

Val His Thr Leu Thr Asn Arg Arg Trp Ser Glu Lys Cys Val Ser Tyr
    610                 615                 620
```

50

```
Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr Ile Ala Phe
625             630             635             640

Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu Asp Arg Pro
                645             650             655

Ser Thr Ser Leu Ile Asp Arg Gly Ile Ala Leu His Lys Met Ile Arg
            660             665             670

Leu Val Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly
        675             680             685

Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Ala Glu Gln
    690             695             700

His Leu Ser Asp Gly Ser Val Ile Pro Gly Asn Gln Phe Ser Tyr Asp
705             710             715             720

Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Glu Tyr Leu Arg Tyr
            725             730             735

Arg Gly Leu Gln Glu Phe Asp Arg Pro Met Gln Tyr Leu Glu Asp Lys
        740             745             750

Tyr Glu Phe Met Thr Ser Glu His Gln Phe Ile Ser Arg Lys Asp Glu
        755             760             765

Gly Asp Arg Met Ile Val Phe Glu Lys Gly Asn Leu Val Phe Val Phe
    770             775             780

Asn Phe His Trp Thr Lys Ser Tyr Ser Asp Tyr Arg Ile Ala Cys Leu
785             790             795             800

Lys Pro Gly Lys Tyr Lys Val Ala Leu Asp Ser Asp Asp Pro Leu Phe
            805             810             815

Gly Gly Phe Gly Arg Ile Asp His Asn Ala Glu Tyr Phe Thr Phe Glu
        820             825             830

Gly Trp Tyr Asp Asp Arg Pro Arg Ser Ile Met Val Tyr Ala Pro Cys
        835             840             845

Lys Thr Ala Val Val Tyr Ala Leu Val Asp Lys Glu Glu Glu Glu Glu
    850             855             860

Glu Glu Glu Val Ala Ala Val Glu Glu Val Val Val Glu Glu Glu
865             870             875


<210> 55
<211> 922
<212> PRT
<213> Pisum sativum


<400> 55
```

```
Met Val Tyr Thr Ile Ser Gly Ile Arg Phe Pro Val Leu Pro Ser Leu
 1               5                   10              15

His Lys Ser Thr Leu Arg Cys Asp Arg Arg Ala Ser Ser His Ser Phe
            20              25              30

Phe Leu Lys Asn Asn Ser Ser Ser Phe Ser Arg Thr Ser Leu Tyr Ala
         35              40              45

Lys Phe Ser Arg Asp Ser Glu Thr Lys Ser Ser Thr Ile Ala Glu Ser
     50              55              60

Asp Lys Val Leu Ile Pro Glu Asp Gln Asp Asn Ser Val Ser Leu Ala
65              70              75              80

Asp Gln Leu Glu Asn Pro Asp Ile Thr Ser Glu Asp Ala Gln Asn Leu
            85              90              95

Glu Asp Leu Thr Met Lys Asp Gly Asn Lys Tyr Asn Ile Asp Glu Ser
            100             105             110

Thr Ser Ser Tyr Arg Glu Val Gly Asp Glu Lys Gly Ser Val Thr Ser
         115             120             125

Ser Ser Leu Val Asp Val Asn Thr Asp Thr Gln Ala Lys Lys Thr Ser
     130             135             140

Val His Ser Asp Lys Lys Val Lys Val Asp Lys Pro Lys Ile Ile Pro
145             150             155             160

Pro Pro Gly Thr Gly Gln Lys Ile Tyr Glu Ile Asp Pro Leu Leu Gln
            165             170             175

Ala His Arg Gln His Leu Asp Phe Arg Tyr Gly Gln Tyr Lys Arg Ile
            180             185             190

Arg Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Asp Ala Phe Ser Arg
         195             200             205

Gly Tyr Glu Lys Phe Gly Phe Thr Arg Ser Ala Thr Gly Ile Thr Tyr
     210             215             220

Arg Glu Trp Ala Pro Gly Ala Lys Ser Ala Ala Leu Val Gly Asp Phe
225             230             235             240

Asn Asn Trp Asn Pro Asn Ala Asp Val Met Thr Lys Asp Ala Phe Gly
            245             250             255

Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile
            260             265             270

Pro His Gly Ser Arg Val Lys Ile His Met Asp Thr Pro Ser Gly Ile
     275             280             285

Lys Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly
     290             295             300
```

```
Glu Ile Pro Tyr Asn Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys
305             310             315             320

Tyr Val Phe Lys His Pro Gln Pro Lys Arg Pro Gln Ser Ile Arg Ile
                325             330             335

Tyr Glu Ser His Ile Gly Met Ser Ser Pro Glu Pro Lys Ile Asn Thr
                340             345             350

Tyr Ala Asn Phe Arg Asp Asp Val Leu Pro Arg Ile Lys Lys Leu Gly
        355             360             365

Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala
    370             375             380

Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe
385             390             395             400

Gly Thr Pro Glu Asp Leu Lys Ser Leu Ile Asp Arg Ala His Glu Leu
            405             410             415

Gly Leu Leu Val Leu Met Asp Ile Val His Ser His Ser Ser Asn Asn
            420             425             430

Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Gly His Tyr Phe
        435             440             445

His Pro Gly Ser Arg Gly Tyr His Trp Met Trp Asp Ser Arg Leu Phe
    450             455             460

Asn Tyr Gly Ser Trp Glu Val Leu Arg Tyr Leu Leu Ser Asn Ala Arg
465             470             475             480

Trp Ala Leu Asp Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val
            485             490             495

Thr Ser Met Met Tyr Thr His His Gly Leu Gln Val Ser Phe Thr Gly
            500             505             510

Asn Tyr Ser Glu Tyr Phe Gly Leu Ala Thr Asp Val Glu Ala Val Val
        515             520             525

Tyr Met Met Leu Val Asn Asp Leu Ile His Gly Leu Pro Pro Glu Ala
    530             535             540

Val Ser Ile Gly Glu Asp Val Ser Gly Met Pro Thr Phe Cys Leu Pro
545             550             555             560

Thr Gln Asp Gly Gly Ile Gly Phe Asn Tyr Arg Leu His Met Ala Val
            565             570             575

Ala Asp Lys Trp Ile Glu Leu Leu Lys Lys Gln Asp Glu Asp Trp Arg
        580             585             590

Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu Lys
        595             600             605
```

```
Cys Val Val Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
    610             615             620

Thr Leu Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
625             630             635             640

Leu Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His
            645             650             655

Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
            660             665             670

Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
        675             680             685

Arg Gly Glu Gln His Leu Pro Asn Gly Lys Ile Val Pro Gly Asn Asn
        690             695             700

Asn Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
705             710             715             720

Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Arg Ala Met Gln His
            725             730             735

Leu Glu Glu Arg Tyr Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser
            740             745             750

Arg Lys Asn Glu Gly Asp Arg Val Ile Ile Phe Glu Arg Asp Asn Leu
        755             760             765

Val Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Lys
    770             775             780

Val Gly Cys Leu Lys Pro Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
785             790             795             800

Asp Thr Leu Phe Gly Gly Phe Asn Arg Leu Asn His Thr Ala Glu Tyr
            805             810             815

Phe Thr Ser Glu Gly Trp Tyr Asp Asp Arg Pro Arg Ser Phe Leu Val
            820             825             830

Tyr Ala Pro Ser Arg Thr Ala Val Val Tyr Ala Leu Ala Asp Gly Val
        835             840             845

Glu Ser Glu Pro Ile Glu Leu Ser Asp Gly Val Glu Ser Glu Pro Ile
    850             855             860

Glu Leu Ser Val Gly Val Glu Ser Glu Pro Ile Glu Leu Ser Val Glu
865             870             875             880

Glu Ala Glu Ser Glu Pro Ile Glu Arg Ser Val Glu Glu Val Glu Ser
            885             890             895

Glu Thr Thr Gln Gln Ser Val Glu Val Glu Ser Glu Thr Thr Gln Gln
        900             905             910
```

54

Ser Val Glu Val Glu Ser Glu Thr Thr Gln
        915                 920


<210> 56
<211> 848
<212> PRT
<213> Arabidopsis thaliana

<400> 56
Arg Ala Arg Val Arg Phe Pro His Leu Pro Ser Ile Lys Lys Lys Asn
 1               5                   10                  15

Ser Ser Leu His Ser Phe Asn Glu Asp Leu Arg Arg Ser Asn Ala Val
            20                  25                  30

Ser Phe Ser Leu Arg Lys Asp Ser Arg Ser Ser Gly Lys Val Phe Ala
            35                  40                  45

Arg Lys Pro Ser Tyr Asp Ser Asp Ser Ser Ser Leu Ala Thr Thr Ala
        50                  55                  60

Ser Glu Lys Leu Arg Gly His Gln Ser Asp Ser Ser Ser Ser Ala Ser
65                  70                  75                  80

Asp Gln Val Gln Ser Arg Asp Thr Val Ser Asp Asp Thr Gln Val Leu
                85                  90                  95

Gly Asn Val Asp Val Gln Lys Thr Glu Glu Ala Gln Glu Thr Glu Thr
            100                 105                 110

Leu Asp Gln Thr Ser Ala Leu Ser Thr Ser Gly Ser Ile Ser Tyr Lys
            115                 120                 125

Glu Asp Phe Ala Lys Met Ser His Ser Val Asp Gln Glu Val Gly Gln
            130                 135                 140

Arg Lys Ile Pro Pro Pro Gly Asp Gly Lys Arg Ile Tyr Asp Ile Asp
145                 150                 155                 160

Pro Met Leu Asn Ser His Arg Asn His Leu Asp Tyr Arg Tyr Gly Gln
                165                 170                 175

Tyr Arg Lys Leu Arg Glu Glu Ile Asp Lys Asn Glu Gly Gly Leu Glu
            180                 185                 190

Ala Phe Ser Arg Gly Tyr Glu Ile Phe Gly Phe Thr Arg Ser Ala Thr
            195                 200                 205

Gly Ile Thr Tyr Arg Glu Trp Ala Pro Gly Ala Lys Ala Ala Ser Leu
        210                 215                 220

Ile Gly Asp Phe Asn Asn Trp Asn Ala Lys Ser Asp Val Met Ala Arg
225                 230                 235                 240

Asn Asp Phe Gly Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly
            245         250             255

Ser Pro Ala Ile Pro His Gly Ser Arg Val Lys Ile Arg Met Asp Thr
            260         265             270

Pro Ser Gly Ile Lys Asp Ser Ile Pro Ala Trp Ile Lys Tyr Ser Val
            275         280             285

Gln Pro Pro Gly Glu Ile Pro Tyr Asn Gly Val Tyr Tyr Asp Pro Pro
    290             295             300

Glu Glu Asp Lys Tyr Ala Phe Lys His Pro Arg Pro Lys Lys Pro Thr
305             310             315             320

Ser Leu Arg Ile Tyr Glu Ser His Val Gly Met Ser Ser Thr Glu Pro
            325             330             335

Lys Ile Asn Thr Tyr Ala Asn Phe Arg Asp Asp Val Leu Pro Arg Ile
            340             345             350

Lys Lys Leu Gly Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His
            355             360             365

Ala Tyr Tyr Ala Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro
    370             375             380

Ser Ser Arg Phe Gly Thr Pro Asp Asp Leu Lys Ser Leu Ile Asp Lys
385             390             395             400

Ala His Glu Leu Gly Leu Val Val Leu Met Asp Ile Val His Ser His
            405             410             415

Ala Ser Lys Asn Thr Leu Asp Gly Leu Asp Met Phe Asp Gly Thr Asp
            420             425             430

Gly Tyr Phe His Ser Gly Ser Arg Gly Tyr His Trp Met Trp Asp Thr
            435             440             445

Arg Leu Phe Asn Tyr Gly Ser Trp Glu Val Leu Arg Tyr Leu Leu Ser
            450             455             460

Asn Ala Arg Trp Ala Leu Glu Glu Tyr Lys Phe Asp Gly Phe Arg Phe
465             470             475             480

Asp Gly Val Thr Ser Met Met Tyr Thr His His Gly Leu Gln Val Glu
            485             490             495

Phe Thr Gly Asn Tyr Asn Glu Tyr Phe Gly Ala Ser Thr Asp Val Asp
            500             505             510

Ala Val Val Tyr Leu Met Leu Val Asn Asp Leu Ile His Gly Leu Tyr
            515             520             525

Pro Glu Ala Ile Val Val Gly Glu Asp Val Ser Gly Met Pro Ala Phe
    530             535             540

56

```
Cys Val Pro Val Arg Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His
545             550             555             560

Met Ala Val Ala Asp Lys Trp Ile Glu Leu Leu Lys Lys Arg Asp Glu
                565             570             575

Asp Trp Gln Val Gly Asp Ile Thr Phe Thr Leu Thr Asn Arg Arg Trp
            580             585             590

Gly Glu Lys Cys Val Val Tyr Ala Glu Ser His Asp Gln Ala Leu Val
            595             600             605

Gly Asp Lys Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp
        610             615             620

Phe Met Ala Val Asp Arg Gln Ala Thr Pro Arg Val Asp Arg Gly Ile
625             630             635             640

Ala Leu His Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu
                645             650             655

Gly Tyr Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile
            660             665             670

Asp Phe Pro Arg Thr Asp Gln His Leu Pro Asp Gly Arg Val Ile Ala
            675             680             685

Gly Asn Asn Gly Ser Tyr Asp Lys Ser Arg Arg Arg Phe Asp Leu Gly
        690             695             700

Asp Ala Glu Tyr Leu Arg Tyr His Gly Leu Gln Glu Phe Asp Arg Ala
705             710             715             720

Met Gln Asn Leu Glu Glu Thr Tyr Gly Phe Met Thr Ser Glu His Gln
                725             730             735

Tyr Ile Ser Pro Lys Asp Glu Gly Asp Arg Val Ile Val Phe Glu Arg
            740             745             750

Gly Asn Leu Leu Phe Val Phe Asn Phe His Trp Thr Asn Ser Tyr Ser
            755             760             765

Asp Tyr Arg Ile Gly Cys Ser Val Pro Gly Lys Tyr Lys Ile Val Leu
    770             775             780

Asp Ser Asp Asn Ser Leu Phe Gly Gly Phe Asn Arg Leu Asp Asp Ser
785             790             795             800

Ala Glu Phe Phe Thr Ser Asp Gly Arg His Asp Asp Arg Pro Cys Ser
            805             810             815

Phe Glu Val Tyr Ala Pro Cys Arg Thr Ala Val Val Tyr Ala Ala Val
            820             825             830

Asp Glu Arg Ser Ser Leu Val Pro Ile Gly Leu Leu Pro Glu Asp Val
        835             840             845
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<210> 57
<211> 800
<212> PRT
<213> Arabidopsis thaliana

<400> 57
Arg Ser Ser Leu Thr Pro Arg Pro Thr Leu Pro Ser Arg Pro Leu Asn
1               5                   10                  15

Thr Gly Phe Asn Ala Gly Asn Ser Thr Leu Ser Phe Phe Phe Lys Lys
            20                  25                  30

His Pro Leu Ser Arg Lys Ile Phe Ala Gly Lys Gln Ser Ala Glu Phe
        35                  40                  45

Asp Ser Ser Ser Gln Ala Ile Ser Ala Ser Glu Lys Val Leu Val Pro
    50                  55                  60

Asp Asn Leu Asp Asp Asp Pro Arg Gly Phe Ser Gln Ile Phe Asp Leu
65                  70                  75                  80

Glu Ser Gln Thr Met Glu Tyr Thr Glu Ala Val Arg Thr Glu Asp Gln
                85                  90                  95

Thr Met Asn Val Val Lys Glu Arg Gly Val Lys Pro Arg Ile Val Pro
            100                 105                 110

Pro Pro Gly Asp Gly Lys Lys Ile Tyr Glu Ile Asp Pro Met Leu Arg
        115                 120                 125

Thr Tyr Asn Asn His Leu Asp Tyr Arg Tyr Gly Gln Tyr Lys Arg Leu
        130                 135                 140

Arg Glu Glu Ile Asp Lys Tyr Glu Gly Gly Leu Glu Ala Phe Ser Arg
145                 150                 155                 160

Gly Tyr Glu Lys Leu Gly Phe Ser Arg Ser Asp Ala Gly Ile Thr Tyr
            165                 170                 175

Arg Glu Trp Ala Pro Gly Ala Lys Ala Ala Ser Leu Ile Gly Asp Phe
            180                 185                 190

Asn Asn Trp Asn Ser Asn Ala Asp Ile Met Thr Arg Asn Glu Phe Gly
            195                 200                 205

Val Trp Glu Ile Phe Leu Pro Asn Asn Thr Asp Gly Ser Pro Ala Ile
    210                 215                 220

Pro His Gly Ser Arg Val Lys Ile Arg Met Asp Thr Pro Ser Gly Ile
225                 230                 235                 240

Lys Asp Ser Ile Pro Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly
            245                 250                 255

Glu Ile Pro Phe Asn Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys

```
              260                    265                    270

Tyr Val Phe Lys His Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile
    275                    280                    285


Tyr Glu Ala His Val Gly Met Ser Ser Thr Glu Pro Met Val Asn Thr
    290                    295                    300

Tyr Ala Asn Phe Arg Asp Asp Val Leu Pro Arg Ile Lys Lys Leu Gly
305                    310                    315                    320

Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr Ala
                   325                    330                    335

Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Cys
            340                    345                    350

Gly Thr Pro Glu Glu Leu Lys Ser Leu Ile Asp Arg Ala His Glu Leu
            355                    360                    365

Gly Leu Val Val Leu Met Asp Ile Val His Ser His Ala Ser Lys Asn
    370                    375                    380

Thr Leu Asp Gly Leu Asn Met Phe Asp Gly Thr Asp Ala His Tyr Phe
385                    390                    395                    400

His Ser Gly Pro Arg Gly Tyr His Trp Met Trp Asp Ser Arg Leu Phe
            405                    410                    415

Asn Tyr Gly Ser Trp Glu Val Leu Arg Tyr Leu Leu Ser Asn Ala Arg
            420                    425                    430

Trp Ala Leu Glu Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val
            435                    440                    445

Thr Ser Met Met Tyr Thr His His Gly Leu Ser Val Gly Phe Thr Gly
    450                    455                    460

Asn Tyr Thr Glu Tyr Phe Gly Leu Glu Thr Asp Val Asp Ala Val Asn
465                    470                    475                    480

Tyr Leu Met Leu Val Asn Asp Met Ile His Gly Leu Tyr Pro Glu Ala
                   485                    490                    495

Ile Thr Val Gly Glu Asp Val Ser Gly Met Pro Thr Phe Cys Asp Pro
            500                    505                    510

Val Gln Asp Gly Gly Val Gly Phe Asp Tyr Arg Leu His Met Ala Ile
            515                    520                    525

Ala Asp Lys Trp Ile Glu Met Leu Lys Lys Arg Asp Glu Asp Trp Gln
    530                    535                    540

Met Gly Asp Ile Ile Tyr Thr Leu Thr Asn Arg Arg Trp Ser Glu Lys
545                    550                    555                    560
```

```
Cys Ile Ser Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys
            565                 570                 575

Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala
            580                 585                 590

Val Asp Arg Pro Ser Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His
            595                 600                 605

Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu
    610                 615                 620

Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro
625                 630                 635                 640

Arg Gly Glu Gln Arg Leu Ser Asp Gly Ser Val Ile Pro Gly Asn Asn
            645                 650                 655

Phe Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp
            660                 665                 670

Tyr Leu Arg Tyr Arg Gly Leu Gln Glu Phe Asp Gln Ala Met Gln His
            675                 680                 685

Leu Glu Glu Asn Tyr Gly Phe Met Thr Ser Glu His Gln Phe Ile Ser
    690                 695                 700

Arg Lys Asp Glu Ala Asp Arg Val Ile Val Phe Glu Arg Gly Asp Leu
705                 710                 715                 720

Val Phe Val Phe Asn Phe His Trp Thr Ser Ser Tyr Phe Asp Tyr Arg
            725                 730                 735

Ile Gly Cys Ser Lys Pro Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp
            740                 745                 750

Asp Pro Leu Phe Gly Gly Phe Ser Arg Ile Asp Arg Ala Ala Glu Tyr
            755                 760                 765

Phe Thr Tyr Asp Gly Leu Tyr Asp Glu Arg Pro Cys Ser Phe Met Val
    770                 775                 780

Tyr Ala Pro Cys Arg Thr Ala Val Val Tyr Ala Leu Ala Asn His Asp
785                 790                 795                 800

<210> 58
<211> 802
<212> PRT
<213> Zea mays

<400> 58
Met Ala Phe Ala Val Ser Gly Ala Val Leu Gly Gly Ala Val Arg Ala
    1                 5                 10                  15

Pro Arg Leu Thr Gly Gly Gly Glu Gly Ser Leu Val Phe Arg His Thr
```

60

Gly Leu Phe Leu Thr Arg Gly Ala Arg Val Gly Cys Ser Cys Thr His
        35                  40                  45

Gly Ala Met Arg Ala Ala Ala Ala Ala Arg Lys Ala Val Met Val Pro
        50              55                  60

Glu Gly Glu Asn Asp Gly Leu Ala Ser Arg Ala Asp Ser Ala Gln Phe
65                      70                  75                  80

Gln Ser Asp Glu Leu Glu Val Pro Asp Ile Ser Glu Glu Thr Thr Cys
                85                  90                  95

Gly Ala Gly Val Ala Asp Ala Gln Ala Leu Asn Arg Val Arg Val Val
            100                 105                 110

Pro Pro Pro Ser Asp Gly Gln Lys Ile Phe Gln Ile Asp Pro Met Leu
        115                 120                 125

Gln Gly Tyr Lys Tyr His Leu Glu Tyr Arg Tyr Ser Leu Tyr Arg Arg
        130                 135                 140

Ile Arg Ser Asp Ile Asp Glu His Glu Gly Gly Leu Glu Ala Phe Ser
145                 150                 155                 160

Arg Ser Tyr Glu Lys Phe Gly Phe Asn Arg Ser Ala Glu Gly Ile Thr
                165                 170                 175

Tyr Arg Glu Trp Ala Pro Gly Ala Phe Ser Ala Ala Leu Val Gly Asp
            180                 185                 190

Phe Asn Asn Trp Asp Pro Asn Ala Asp Arg Met Ser Lys Asn Glu Phe
            195                 200                 205

Gly Val Trp Glu Ile Phe Leu Pro Asn Asn Ala Asp Gly Thr Ser Pro
    210                 215                 220

Ile Pro His Gly Ser Arg Val Lys Val Arg Met Asp Thr Pro Ser Gly
225                 230                 235                 240

Ile Lys Asp Ser Ile Pro Ala Trp Ile Lys Tyr Ser Val Gln Ala Pro
                245                 250                 255

Gly Glu Ile Pro Tyr Asp Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Val
            260                 265                 270

Lys Tyr Val Phe Arg His Ala Gln Pro Lys Arg Pro Lys Ser Leu Arg
        275                 280                 285

Ile Tyr Glu Thr His Val Gly Met Ser Ser Pro Glu Pro Lys Ile Asn
        290                 295                 300

Thr Tyr Val Asn Phe Arg Asp Glu Val Leu Pro Arg Ile Lys Lys Leu
305                 310                 315                 320

Gly Tyr Asn Ala Val Gln Ile Met Ala Ile Gln Glu His Ser Tyr Tyr

```
                325                         330                         335

    Gly Ser Phe Gly Tyr His Val Thr Asn Phe Phe Ala Pro Ser Ser Arg
                340             345             350

    Phe Gly Thr Pro Glu Asp Leu Lys Ser Leu Ile Asp Arg Ala His Glu
                355             360             365


    Leu Gly Leu Leu Val Leu Met Asp Val Val His Ser His Ala Ser Ser
                370             375             380

    Asn Thr Leu Asp Gly Leu Asn Gly Phe Asp Gly Thr Asp Thr His Tyr
    385             390             395             400

    Phe His Ser Gly Pro Arg Gly His His Trp Met Trp Asp Ser Arg Leu
                405             410             415

    Phe Asn Tyr Gly Asn Trp Glu Val Leu Arg Phe Leu Leu Ser Asn Ala
                420             425             430

    Arg Trp Ala Leu Glu Glu Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly
                435             440             445

    Val Thr Ser Met Met Tyr Thr His His Gly Leu Gln Val Thr Phe Thr
                450             455             460

    Gly Asn Phe Asn Glu Tyr Phe Gly Phe Ala Thr Asp Val Asp Ala Val
    465             470             475             480

    Val Tyr Leu Met Leu Val Asn Asp Leu Ile His Gly Leu Tyr Pro Glu
                485             490             495

    Ala Val Thr Ile Gly Glu Asp Val Ser Gly Met Pro Thr Phe Ala Leu
                500             505             510

    Pro Val His Asp Gly Gly Val Gly Phe Asp Tyr Arg Met His Met Ala
                515             520             525

    Val Ala Asp Lys Trp Ile Asp Leu Leu Lys Gln Ser Asp Glu Thr Trp
                530             535             540

    Lys Met Gly Asp Ile Val His Thr Leu Thr Asn Arg Arg Trp Leu Glu
    545             550             555             560

    Lys Cys Val Thr Tyr Ala Glu Ser His Asp Gln Ala Leu Val Gly Asp
                565             570             575

    Lys Thr Ile Ala Phe Trp Leu Met Asp Lys Asp Met Tyr Asp Phe Met
                580             585             590

    Ala Leu Asp Arg Pro Ser Thr Pro Thr Ile Asp Arg Gly Ile Ala Leu
                595             600             605

    His Lys Met Ile Arg Leu Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr
                610             615             620
```

```
Leu Asn Phe Met Gly Asn Glu Phe Gly His Pro Glu Trp Ile Asp Phe
625             630             635             640

Pro Arg Gly Pro Gln Arg Leu Pro Ser Gly Lys Phe Ile Pro Gly Asn
            645             650             655

Asn Asn Ser Tyr Asp Lys Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala
            660             665             670


Asp Tyr Leu Arg Tyr His Gly Met Gln Glu Phe Asp Gln Ala Met Gln
            675             680             685

His Leu Glu Gln Lys Tyr Glu Phe Met Thr Ser Asp His Gln Tyr Ile
            690             695             700

Ser Arg Lys His Glu Glu Asp Lys Val Ile Val Phe Glu Lys Glu Asp
705             710             715             720

Leu Val Phe Val Phe Asn Phe His Cys Asn Asn Ser Tyr Phe Asp Tyr
            725             730             735

Arg Ile Gly Cys Arg Lys Pro Gly Val Tyr Lys Val Val Leu Asp Ser
            740             745             750

Asp Ala Gly Leu Phe Gly Gly Phe Ser Arg Ile His His Ala Ala Glu
            755             760             765

His Phe Thr Ala Asp Cys Ser His Asp Asn Arg Pro Tyr Ser Phe Ser
            770             775             780

Val Tyr Thr Pro Ser Arg Thr Cys Val Val Tyr Ala Pro Val Glu Pro
785             790             795             800

Val Glu


<210> 59
<211> 828
<212> PRT
<213> Oryza sativa

<400> 59
Met Ala Ala Pro Ala Ser Ala Val Pro Gly Ser Ala Ala Gly Leu Arg
 1               5               10              15

Ala Gly Ala Val Arg Phe Pro Val Pro Ala Gly Ala Arg Ser Trp Arg
            20              25              30

Ala Ala Ala Glu Leu Pro Thr Ser Arg Ser Leu Leu Ser Gly Arg Arg
            35              40              45

Phe Pro Gly Ala Val Arg Val Gly Gly Ser Gly Gly Arg Val Ala Val
        50              55              60

Arg Ala Ala Gly Ala Ser Gly Glu Val Met Ile Pro Glu Gly Glu Ser
 65              70              75              80
```

63

```
Asp Gly Met Pro Val Ser Ala Gly Ser Asp Asp Leu Gln Leu Pro Ala
                85                      90                  95

Leu Asp Asp Glu Leu Ser Thr Glu Val Gly Ala Glu Val Glu Ile Glu
            100             105             110

Ser Ser Gly Ala Ser Asp Val Glu Gly Val Lys Arg Val Val Glu Glu
            115             120             125


Leu Ala Ala Glu Gln Lys Pro Arg Val Val Pro Pro Thr Gly Asp Gly
    130             135             140

Gln Lys Ile Phe Gln Met Asp Ser Met Leu Asn Gly Tyr Lys Tyr His
145             150             155             160

Leu Glu Tyr Arg Tyr Ser Leu Tyr Arg Arg Leu Arg Ser Asp Ile Asp
            165             170             175

Gln Tyr Glu Gly Gly Leu Glu Thr Phe Ser Arg Gly Tyr Glu Lys Phe
            180             185             190

Gly Phe Asn His Ser Ala Glu Gly Val Thr Tyr Arg Glu Trp Ala Pro
            195             200             205

Gly Ala His Ser Ala Ala Leu Val Gly Asp Phe Asn Asn Trp Asn Pro
    210             215             220

Asn Ala Asp Arg Met Ser Lys Asn Glu Phe Gly Val Trp Glu Phe Ile
225             230             235             240

Leu Pro Asn Asn Ala Asp Gly Ser Ser Pro Ile Pro His Gly Ser Arg
            245             250             255

Val Lys Val Arg Met Glu Thr Pro Ser Gly Ile Lys Asp Ser Ile Pro
            260             265             270

Ala Trp Ile Lys Tyr Ser Val Gln Ala Ala Gly Glu Ile Pro Tyr Asn
    275             280             285

Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr Ile Phe Lys His
    290             295             300

Pro Gln Pro Lys Arg Arg Lys Ser Leu Arg Ile Tyr Glu Thr His Val
305             310             315             320

Gly Met Ser Ser Thr Glu Pro Lys Ile Asn Thr Tyr Ala Asn Phe Arg
            325             330             335

Asp Glu Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala Val Gln
            340             345             350

Ile Met Ala Ile Gln Glu His Ala Tyr Tyr Gly Ser Phe Gly Tyr His
    355             360             365

Val Thr Asn Phe Phe Ala Pro Ser Ser Arg Phe Gly Thr Pro Glu Asp
```

64

```
            370                     375                     380

Leu Lys Ser Leu Ile Asp Lys Ala His His Leu Gly Leu Val Val Leu
385                 390                 395                 400

Met Asp Val Val His Ser His Ala Ser Asn Asn Thr Leu Asp Gly Leu
                405                 410                 415

Asn Gly Phe Asp Gly Thr Asp Thr His Tyr Phe His Ser Gly Ser Arg
            420                 425                 430


Gly His His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly Asn Trp
        435                 440                 445

Glu Val Leu Arg Phe Leu Leu Ser Asn Ala Arg Trp Ala Leu Glu Glu
    450                 455                 460

Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met Met Tyr
465                 470                 475                 480

Thr His His Gly Leu Gln Val Ala Phe Thr Gly Asn Tyr Ser Glu Tyr
            485                 490                 495

Phe Gly Phe Ala Thr Asp Ala Asp Ala Val Val Tyr Leu Met Leu Val
        500                 505                 510

Asn Asp Leu Ile His Gly Leu Tyr Pro Glu Ala Ile Thr Ile Gly Glu
        515                 520                 525

Asp Val Ser Ser Met Pro Thr Phe Ala Leu Pro Val Gln Asp Gly Gly
    530                 535                 540

Val Gly Phe Asp Tyr Arg Leu His Met Ala Val Pro Asp Lys Trp Ile
545                 550                 555                 560

Glu Leu Leu Lys Gln Ser Asp Glu Ser Trp Lys Met Gly Asp Ile Val
            565                 570                 575

His Thr Leu Thr Asn Arg Arg Trp Ser Glu Lys Cys Val Thr Tyr Ala
            580                 585                 590

Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr Ile Ala Phe Trp
        595                 600                 605

Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Leu Asp Arg Pro Ala
    610                 615                 620

Thr Pro Ser Ile Asp Arg Gly Ile Ala Leu His Lys Met Ile Arg Leu
625                 630                 635                 640

Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn
            645                 650                 655

Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Ala Pro Gln Val
        660                 665                 670
```

```
Leu Pro Asn Gly Lys Phe Ile Pro Gly Asn Asn Asn Ser Tyr Asp Lys
    675             680                 685

Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr Leu Arg Tyr Arg
    690             695                 700

Gly Met Leu Glu Phe Asp Arg Ala Met Gln Ser Leu Glu Glu Lys Tyr
705             710                 715                 720

Gly Phe Met Thr Ser Asp His Gln Tyr Ile Ser Arg Lys His Glu Glu
            725                 730                 735


Asp Lys Met Ile Ile Phe Glu Lys Gly Asp Leu Val Phe Val Phe Asn
            740                 745                 750

Phe His Trp Ser Asn Ser Tyr Phe Asp Tyr Arg Val Gly Cys Leu Lys
            755                 760                 765

Pro Gly Lys Tyr Lys Val Val Leu Asp Ser Asp Ala Gly Leu Phe Gly
    770                 775                 780

Gly Phe Gly Arg Ile His His Thr Ala Glu His Phe Thr Ala Asp Cys
785                 790                 795                 800

Ser His Asp Asn Arg Pro Tyr Ser Phe Ser Val Tyr Ser Pro Ser Arg
            805                 810                 815

Thr Cys Val Val Tyr Ala Pro Ala Glu Pro Ala Glu
            820                 825


<210> 60
<211> 844
<212> PRT
<213> Manihot esculenta

<400> 60
Met Gly His Tyr Thr Ile Ser Gly Ile Arg Phe Pro Cys Ala Pro Leu
  1             5                 10                  15

Arg Lys Ser Gln Ser Thr Gly Phe His Gly Asp Arg Arg Thr Ser Ser
                20                 25                  30

Cys Leu Ser Phe Asn Phe Lys Lys Ala Ala Phe Ser Arg Arg Val Phe
            35                  40                  45

Ser Gly Lys Ser Ser His Glu Ser Asp Ser Ser Asn Val Met Val Thr
        50                  55                  60

Ala Ser Lys Arg Val Leu Pro Asp Gly Arg Ile Glu Cys Tyr Ser Ser
65                  70                  75                  80

Ser Thr Asp Gln Leu Glu Ala Pro Gly Thr Val Ser Glu Glu Ser Gln
                85                  90                  95

Val Leu Thr Asp Val Glu Ser Leu Ile Met Asp Asp Lys Ile Val Glu
```

66

Asp Glu Val Asn Lys Glu Ser Val Pro Met Arg Glu Thr Val Ser Ile
        115                 120                 125

Gly Lys Ile Gly Ser Lys Pro Arg Ser Ile Pro Pro Pro Gly Arg Gly
        130                 135                 140

Gln Arg Ile Tyr Asp Ile Asp Pro Ser Leu Thr Gly Phe Arg Gln His
145                 150                 155                 160

Leu Asp Tyr Arg Tyr Ser Gln Tyr Lys Arg Leu Arg Glu Glu Ile Asp
                165                 170                 175

Lys Tyr Glu Gly Ser Leu Asp Ala Phe Ser Arg Gly Tyr Glu Lys Phe
        180                 185                 190

Gly Phe Ser Arg Ser Glu Thr Gly Ile Thr Tyr Arg Glu Trp Ala Pro
        195                 200                 205

Gly Ala Thr Trp Ala Ala Leu Ile Gly Asp Phe Asn Asn Trp Asn Pro
        210                 215                 220

Asn Ala Asp Val Met Thr Gln Asn Glu Cys Gly Val Trp Glu Ile Phe
225                 230                 235                 240

Leu Pro Asn Asn Ala Asp Gly Ser Pro Pro Ile Pro His Gly Ser Arg
                245                 250                 255

Val Lys Ile Arg Met Asp Thr Pro Ser Gly Asn Lys Asp Ser Ile Pro
                260                 265                 270

Ala Trp Ile Lys Phe Ser Val Gln Ala Pro Gly Glu Leu Pro Tyr Asn
                275                 280                 285

Gly Ile Tyr Tyr Asp Pro Pro Glu Glu Glu Lys Tyr Val Phe Lys Asn
        290                 295                 300

Pro Gln Pro Lys Arg Pro Lys Ser Leu Arg Ile Tyr Glu Ser His Val
305                 310                 315                 320

Gly Met Ser Ser Thr Glu Pro Val Ile Asn Thr Tyr Ala Asn Phe Arg
                325                 330                 335

Asp Asp Val Leu Pro Arg Ile Lys Lys Leu Gly Tyr Asn Ala Val Gln
                340                 345                 350

Leu Met Ala Ile Gln Glu His Ser Tyr Tyr Ala Ser Phe Gly Tyr His
        355                 360                 365

Val Thr Asn Phe Tyr Ala Ala Ser Ser Arg Phe Gly Thr Pro Asp Asp
        370                 375                 380

Leu Lys Ser Leu Val Asp Lys Ala His Glu Leu Gly Leu Leu Val Leu
385                 390                 395                 400

Met Asp Ile Val His Ser His Ala Ser Thr Asn Thr Leu Asp Gly Leu

Asn Met Phe Asp Gly Thr Asp Gly His Tyr Phe His Ser Gly Pro Arg
        420                 425                 430

Gly His His Trp Met Trp Asp Ser Arg Leu Phe Asn Tyr Gly Ser Trp
        435                 440                 445

Glu Val Leu Arg Phe Leu Leu Ser Asn Thr Arg Trp Trp Leu Asp Glu
    450                 455                 460

Tyr Lys Phe Asp Gly Phe Arg Phe Asp Gly Val Thr Ser Met Met Tyr
465                 470                 475                     480

Thr His His Gly Leu Gln Val Asp Phe Thr Gly Asn Tyr Asn Glu Tyr
                485                 490                 495

Phe Gly Tyr Ala Thr Asp Val Asp Ala Val Val Tyr Leu Met Leu Leu
            500                 505                 510

Asn Asp Met Ile His Gly Leu Phe Pro Glu Ala Val Thr Ile Gly Glu
        515                 520                 525

Asp Val Ser Gly Met Pro Thr Val Cys Ile Pro Val Glu Asp Gly Gly
    530                 535                 540

Val Gly Phe Asp Tyr Arg Leu His Met Ala Val Ala Asp Lys Trp Val
545                 550                 555                     560

Glu Ile Ile Gln Lys Arg Asp Glu Asp Trp Lys Met Gly Asp Ile Val
            565                 570                 575

His Met Leu Thr Asn Arg Arg Trp Leu Glu Lys Cys Val Ser Tyr Ala
            580                 585                 590

Glu Ser His Asp Gln Ala Leu Val Gly Asp Lys Thr Ile Ala Phe Trp
        595                 600                 605

Leu Met Asp Lys Asp Met Tyr Asp Phe Met Ala Arg Asp Arg Pro Ser
    610                 615                 620

Thr Pro Leu Ile Asp Arg Gly Ile Ala Leu His Lys Met Ile Arg Leu
625                 630                 635                     640

Ile Thr Met Gly Leu Gly Gly Glu Gly Tyr Leu Asn Phe Met Gly Asn
                645                 650                 655

Glu Phe Gly His Pro Glu Trp Ile Asp Phe Pro Arg Gly Asp Arg His
            660                 665                 670

Leu Pro Asn Gly Lys Val Ile Pro Gly Asn Asn His Ser Tyr Asp Lys
        675                 680                 685

Cys Arg Arg Arg Phe Asp Leu Gly Asp Ala Asp Tyr Leu Arg Tyr His
    690                 695                 700

```
Gly Met Gln Glu Phe Asp Gln Ala Met Gln His Leu Glu Glu Ala Tyr
705             710             715             720

Gly Phe Met Thr Ser Glu His Gln Tyr Ile Ser Arg Lys Asp Glu Gly
                725             730             735

Asp Arg Ile Ile Val Phe Glu Arg Gly Asn Leu Val Phe Val Phe Asn
            740             745             750

Phe His Trp Thr Asn Ser Tyr Ser Asp Tyr Arg Val Gly Cys Phe Lys
        755             760             765

Ser Gly Lys Tyr Lys Ile Val Leu Asp Ser Asp Asp Gly Leu Phe Gly
    770             775             780


Gly Phe Asn Arg Leu Ser His Asp Ala Glu His Phe Thr Phe Asp Gly
785             790             795             800

Trp Tyr Asp Asn Arg Pro Arg Ser Phe Met Val Tyr Ala Pro Ser Arg
            805             810             815

Thr Ala Val Val His Ala Leu Val Glu Asp Glu Glu Asn Glu Ala Glu
        820             825             830

Asn Glu Val Glu Ser Glu Val Lys Pro Ala Ser Gly
    835             840
```